Figure 4-16. Reported occurrence of other resident fish species overlain with the footprints of the Pebble 2020 Mine Plan and the Expanded Mine Scenario. Species distributions are based on the Alaska Freshwater Fish Inventory (ADF&G 2022a).

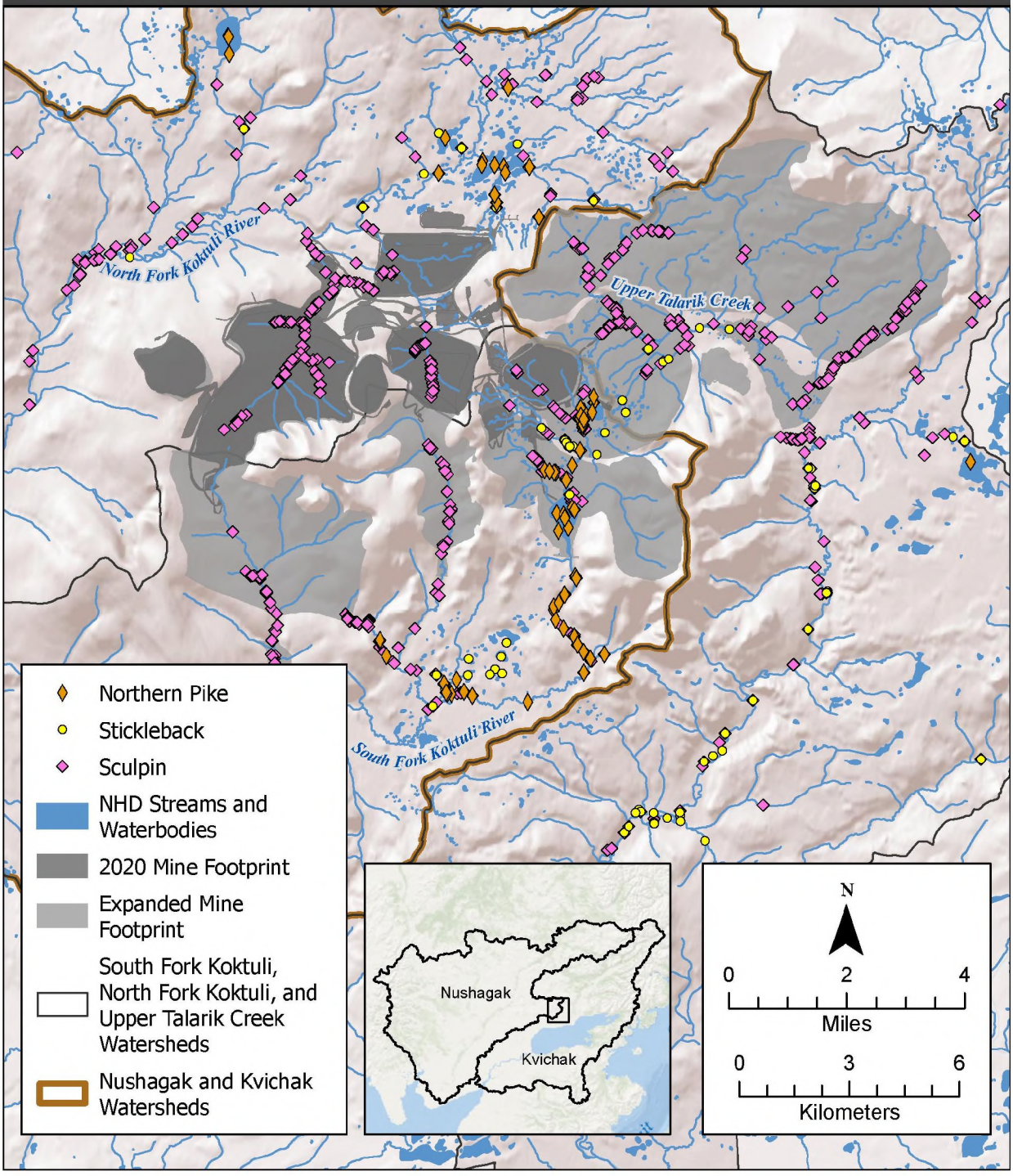


Figure 4-17. Reported Arctic Grayling, Rainbow Trout, and Dolly Varden occurrence in the South Fork Koktuli River, North Fork Koktuli River, and Upper Talarik Creek watersheds, downstream of the Pebble 2020 Mine Plan and Expanded Mine Scenario. Species distributions are based on the Alaska Freshwater Fish Inventory (ADF&G 2022a).

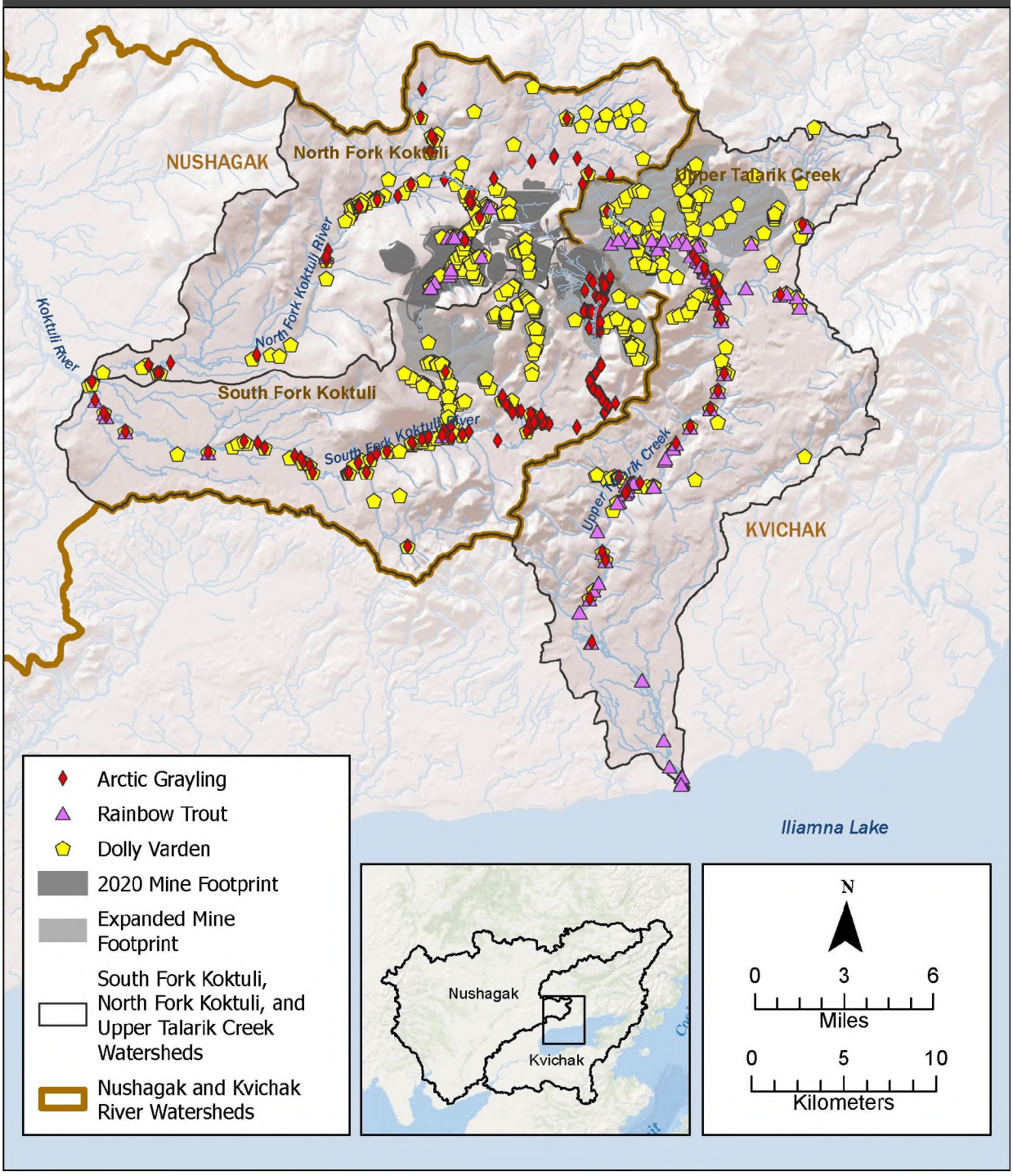
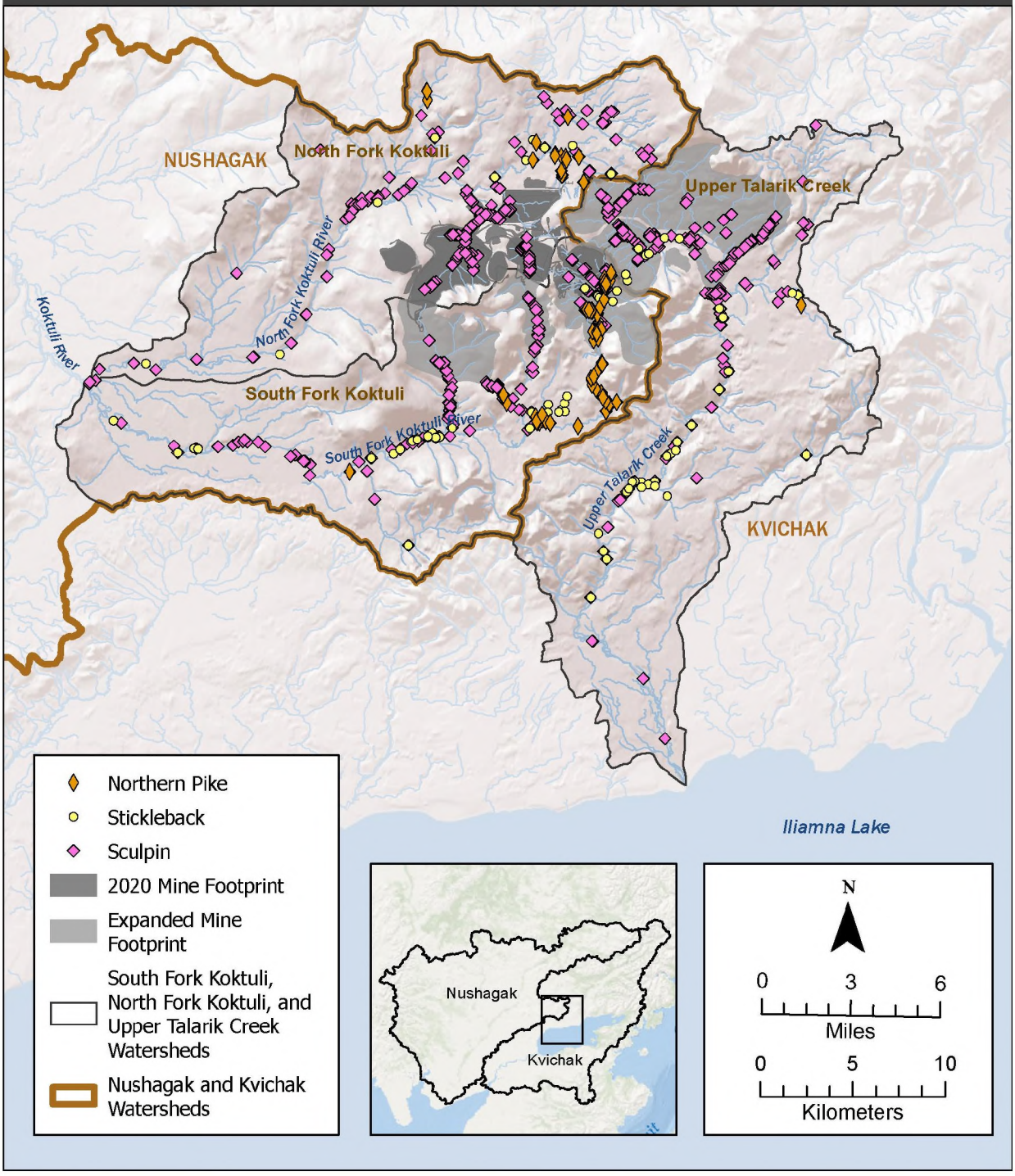


Figure 4-18. Reported occurrence of other non-salmon fish species in the South Fork Koktuli River, North Fork Koktuli River, and Upper Talarik Creek watersheds, downstream of the Pebble 2020 Mine Plan and Expanded Mine Scenario. Species distributions are based on the Alaska Freshwater Fish Inventory (ADF&G 2022a).



4.3.1.2.3 Cumulative Effects of Loss of Wetlands and Other Waters that Support Anadromous Fish Streams

In addition to the 2,108 acres (8.5 km^2) of wetlands and other waters that would be permanently lost under the 2020 Mine Plan, the Expanded Mine Scenario would result in the permanent loss of an additional 8,756 acres (35.4 km^2) of wetlands and other waters in the SFK and UTC watersheds, primarily affecting broad-leaved deciduous shrub and herbaceous type wetlands (Figure 4-12) (USACE 2020a: Table 4.22-40). The greatest losses of wetlands and other waters under the Expanded Mine Scenario would occur in the Headwaters Koktuli River (i.e., the SFK, NFK, and Middle Koktuli River HUC-12 watersheds) and UTC watersheds, with losses of wetlands and other waters in these watersheds increasing from 6 percent[86] under the 2020 Mine Plan to 23 percent (USACE 2020a: Section 4.22). The unprecedented loss of thousands of acres of wetlands under the Expanded Mine Scenario would eliminate nutrient-rich, structurally complex, and thermally and hydraulically diverse habitats, including crucial overwintering areas, that are essential to rearing salmonids (EPA 2014: Chapter 7). Coho, Chinook, Sockeye, and Chum salmon would be adversely affected under the Expanded Mine Scenario (Figures 4-13 and 4-14). The Expanded Mine Scenario would also result in a loss or reduction of water, nutrient, detritus, and macroinvertebrate exports to downstream areas, the losses of which would affect downstream food webs. These losses, of an even greater scope and scale than losses anticipated from the 2020 Mine Plan, would reduce the overall capacity and productivity of Coho, Chinook, Sockeye, and Chum salmon across the SFK, NFK, and UTC watersheds.

In addition to salmon, Rainbow Trout, Arctic Grayling, and Northern Pike rear in these wetland areas; Northern Pike also spawn in these habitats (Figures 4-15 and 4-16). These species support both subsistence and recreational fisheries in downstream areas. Because these species can move significant distances across diverse freshwater habitats throughout their life cycles, large losses of wetland rearing habitat could adversely affect these downstream fisheries.

4.3.1.2.4 Cumulative Effects of Additional Degradation of Streams, Wetlands, and Other Waters Beyond the Mine Site Footprint

The 2020 Mine Plan would be expected to degrade additional wetlands, streams, and other waters beyond the mine site footprint due to dewatering, fragmentation, and fugitive dust. These secondary effects of the discharge of dredged or fill material from construction and routine operation of the 2020 Mine Plan would result in adverse impacts to approximately 845 additional acres of wetlands and other waters (3.4 km^2) and 29.9 miles (48.1 km) of streams at the mine site (PLP 2020b, USACE 2020b). Impacts from dewatering, fragmentation, and fugitive dust would increase under the Expanded Mine Scenario and further reduce the quality and extent of fish habitats in the SFK and UTC watersheds (USACE 2020a: Section 4.22).

Under the Expanded Mine Scenario, aquatic resources could experience multiple secondary impacts, resulting in overlap in the area or miles affected when accounting for the effects of dewatering, habitat

[86] In its comments on the proposed determination, PLP indicated that following publication of the FEIS it provided information to USACE that this value is 4.8 percent based on updated mapping results.

fragmentation, and fugitive dust deposition individually. After correcting for this overlap, the Expanded Mine Scenario would adversely affect an additional 1,829 acres (7.4 km^2) of wetlands and other waters and 17 miles (27.4 km) of streams at the mine site from dewatering, habitat fragmentation, and fugitive dust. The following discussion considers these secondary impacts individually, without adjusting for overlap (USACE 2020a: Table 4.22-40).

Dewatering associated with the Expanded Mine Scenario would impact 338 acres (1.4 km^2) of wetlands and other waters and 3.2 miles (5.1 km) of streams (USACE 2020a: Table 4.22-40). Dewatering of wetlands and other waters causes the alteration or loss of wetland hydrology and may result in the conversion of habitats to more mesic types. Drawdown of groundwater is expected primarily around the open pit due to dewatering activities, but would also occur around quarries, TSFs, and WMPs due to diversions and drainage/underdrain systems. Altered saturated surface flow and shallow interflow resulting from a depression of the groundwater table is expected to adversely affect wetlands, surface waters, and vegetation in the drawdown area (USACE 2020a: Section 4.22). Dewatering impacts to slope wetlands (which constitute the majority of wetland acres impacted at the mine site) would be severe and "[d]ue to the groundwater storage and organic matter production and nutrient cycling capacity of slope wetlands, their loss would likely reduce the functional capacity of the watershed to maintain downstream baseflows, as well as reducing the subsidy of organic matter and nutrients to downstream aquatic ecosystems and organisms" (USACE 2020a: Page 4.22-30). Dewatering represents a secondary but permanent impact to streams, wetlands, and other waters (USACE 2020a: Section 4.22).

Fragmentation associated with the Expanded Mine Scenario would affect 1,538 acres (6.2 km^2) of wetlands and other waters and 8.4 miles (13.5 km) of streams (USACE 2020a: Table 4.22-40). This represents a nearly 600 percent increase in fragmentation impacts on wetlands and other waters and a 91 percent increase in fragmentation impacts on streams when compared to the 2020 Mine Plan. Fragmentation of wetlands and other waters results when development divides a formerly continuous aquatic resource into smaller, more isolated remnants. Habitat fragmentation represents a secondary but permanent impact on wetlands, streams, and other waters (USACE 2020a: Section 4.22). Decreased connectivity of aquatic ecosystems could preclude the completion of aquatic organisms' life cycles; for example, anadromous fish may be unable to reach spawning grounds or access off-channel habitat (USACE 2020a: Section 4.22). For anadromous fishes, the most severe form of fragmentation occurs when discontinuities are created that either separate an aquatic habitat (stream, wetland, lake, or pond) or complex of aquatic habitats from the tributary network in such a way that precludes use (e.g., spawning, rearing, feeding, migration, overwintering) by anadromous fish species and life stages documented to occur in the habitat or eliminate the movement of water or dissolved or suspended materials to downstream anadromous fish streams (Box 4-1).

Fragmentation of stream channels and adjacent wetlands without hydrologic surface connections are expected to result in a complete loss of function. Partial loss of function would be expected for other types of wetlands, such as slope and depressional wetlands, which would likely become drier due to the diversion of shallow groundwater and surface water and the reduction of catchment areas (USACE 2020a: Section 4.22). Habitat fragmentation would likely reduce the functional capacity of the

watershed to maintain downstream baseflows, as well as reduce subsidies of organic matter and nutrients to downstream aquatic ecosystems and organisms (USACE 2020a: Section 4.22).

Fugitive dust associated with the Expanded Mine Scenario would affect 1,093 acres (4.4 km^2) of wetlands and other waters and 15 miles (24.1 km) of streams (USACE 2020a: Table 4.22-40). Fugitive dust would be produced from ground-disturbing actions during construction, operations, and closure, and from wind or vehicle dispersal of exposed soil in the post-closure period (USACE 2020a: Section 4.22). Fugitive dust has the potential to collect on wetland vegetation and accumulate in waters, with adverse consequences for plant physiology, water quality, biotic community composition, and the overall function and value of wetlands, streams, and other waters (USACE 2020a: Section 4.22). The majority of the potentially affected wetlands at the mine site are particularly susceptible to the adverse effects of dust deposition because of their vegetation type and structure (USACE 2020a: Section 4.22).

4.3.1.3 Summary

EPA has determined that direct and secondary effects of the discharge of dredged or fill material from construction and routine operation of the 2020 Mine Plan would result in significant degradation under the CWA Section 404(b)(1) Guidelines. Additionally, EPA has determined that direct and secondary effects of the discharge of dredged or fill material associated with future proposals to construct and operate a mine at the Pebble deposit that would result in adverse effects that are the same, similar, or greater than the adverse effects of the 2020 Mine Plan would also result in significant degradation under the CWA Section 404(b)(1) Guidelines (40 CFR 230.10(c), Section 4.3.1.1). These findings are based on the significantly adverse effects that the discharge of dredged or fill material would have on special aquatic sites, life stages of anadromous fishes, anadromous fish habitat, and aquatic ecosystem diversity, productivity, and stability under the CWA Section 404(b)(1) Guidelines.

The Expanded Mine Scenario represents a reasonably foreseeable expansion of mine size over time, from 1.3 billion tons up to 8.6 billion tons. This expansion would dramatically increase the amount of destruction and degradation of anadromous fishery areas in the SFK, NFK, and UTC watersheds, including a more than 400 percent increase in the length of anadromous fish streams permanently lost. There are no examples of other projects resulting in this level of permanent loss of anadromous fish streams in the CWA Section 404 regulatory program in Alaska; thus, there are no analogous Section 404 permitting cases with which to make any meaningful comparisons.

In addition to the losses estimated for the 2020 Mine Plan, estimated impacts of the Expanded Mine Scenario include the permanent loss of an additional 35 miles (56.3 km) of documented anadromous fish streams, an additional 295.5 miles (475.6 km) of streams that support anadromous fish streams, and an additional 8,756 acres (35.4 km^2) of wetlands and other waters across the SFK and UTC watersheds (USACE 2020a: Table 4.22-40). These losses would represent extraordinary and unprecedented levels of anadromous fish habitat loss and degradation, significantly expanding the unacceptable adverse effects identified for the 2020 Mine Plan.

Secondary effects of the discharge of dredged or fill material from construction and routine operation of the 2020 Mine Plan would result in adverse impacts to approximately 845 acres (3.4 km^2) of wetlands and other waters and 29.9 miles (48.1 km) of streams at the mine site from dewatering, habitat fragmentation, and fugitive dust (PLP 2020b, USACE 2020b). The FEIS estimates that these secondary effects of the discharge of dredged or fill material from the construction and routine operation of the Expanded Mine Scenario would adversely affect an additional approximately 1,829 acres (7.4 km^2) of wetlands and other waters and 17 miles (27.4 km) of streams at the mine site (USACE 2020a: Table 4.22-40) and would further reduce the quality and extent of anadromous fish habitat in the SFK and UTC watersheds.

The losses of and impacts on salmon habitat could cause the extirpation of unique local populations of Coho, Sockeye, and Chinook salmon that would affect the overall genetic diversity of each species. This reduction in genetic diversity could adversely affect the stability and sustainability of valuable subsistence, commercial, and recreational salmon fisheries. Subsistence harvests and recreational fishing of non-salmon species could also suffer. For example, Rainbow Trout, Dolly Varden, and Northern Pike are found in the affected waters, and would experience additional habitat losses due to mine expansion.

Species with extended freshwater rearing periods, such as Coho, Chinook, and Sockeye salmon, are more likely to be extinct, endangered, or threatened than species that spend less time in freshwater habitats (NRC 1996, Gustafson et al. 2007). Therefore, the losses and degradation of discrete, productive freshwater habitats for salmon estimated under the Expanded Mine Scenario could threaten multiple distinct populations of species such as Coho, Chinook, and Sockeye salmon. Losses of these populations would degrade the overall stability of fisheries within the SFK, NFK, and UTC watersheds. Ultimately, cumulative effects on streams, wetlands, and other aquatic resources from the discharge of dredged or fill material associated with the Expanded Mine Scenario would impair the health of the SFK, NFK, and UTC watersheds and cause or contribute to significant degradation (40 CFR 230.10(c)) of the watersheds' fishery areas.

4.3.2 Compensatory Mitigation Evaluation

EPA has determined that certain discharges of dredged or fill material into waters of the United States for the construction and routine operation of the 2020 Mine Plan will have unacceptable adverse effects on anadromous fishery areas (Sections 4.2.1 through 4.2.4). EPA has also determined that discharges of dredged or fill material associated with the development of the Pebble deposit anywhere at the mine site area within the SFK and NFK watersheds that would result in the same or greater levels of loss or streamflow changes as the 2020 Mine Plan also will have unacceptable adverse effects on anadromous fishery areas in these watersheds, because such discharges would involve the same aquatic resources characterized as part of the evaluation of the 2020 Mine Plan. Further, EPA has determined that discharges of dredged or fill material associated with future plans to develop the Pebble deposit will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds if

the effects of such discharges are similar or greater in nature and magnitude to those described in Sections 4.2.1 through 4.2.4.

The CWA Section 404(b)(1) Guidelines direct that no discharge of dredged or fill material shall be permitted unless all appropriate and practicable steps have been taken to minimize and compensate for the project's adverse impacts on the aquatic ecosystem (40 CFR 230.10(d)). Discharges of dredged or fill material for the construction and routine operation of the 2020 Mine Plan would have extensive unavoidable adverse impacts to aquatic resources that would require compensatory mitigation (USACE 2020b).

Under Section 404(c) of the CWA, EPA has discretionary authority to deny or restrict the use of any defined area as a disposal site "whenever" it determines that the discharge of dredged or fill material will have an unacceptable adverse effect on statutorily enumerated aquatic resources. The statutory standard does not direct EPA to consider mitigation when determining what constitutes an unacceptable adverse effect, nor restrict EPA to exercising its authority unless and until EPA has before it a USACE permit identifying required mitigation. EPA's regulations provide that "[i]n evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) guidelines" (40 CFR 231.2). EPA does not view the mitigation provisions to be a relevant portion of the Guidelines that should be considered in determining unacceptability in this circumstance because there is no permit requiring mitigation and, in fact, USACE expressly rejected PLP's proposed mitigation.

Nonetheless, although not required, EPA evaluated the two compensatory mitigation plans (CMPs) PLP submitted to USACE in 2020. As described in Section 4.3.2.2, both plans fail to adequately mitigate the adverse effects that are the subject of this final determination to an acceptable level.

In addition to the two CMPs PLP proposed to USACE in 2020, during development and finalization of the 2014 BBA, PLP and other commenters suggested an array of measures as having the potential to compensate for the nature and magnitude of adverse impacts on wetlands, streams, and fishes from the discharge of dredged or fill material associated with developing the Pebble deposit. EPA evaluated the numerous additional measures that PLP and others proposed prior to issuing the 2014 Proposed Determination. During the public comment period for the 2014 Proposed Determination, several commenters, including PLP, suggested additional measures as having the potential to compensate for the nature and magnitude of adverse impacts on aquatic resources from the discharge of dredged or fill material associated with developing the Pebble deposit.

PLP did not propose such measures to USACE during the CWA Section 404 permit review process. EPA provides, for informational purposes, an updated evaluation of these measures in Appendix C. Available information demonstrates that known compensation measures are unlikely to adequately mitigate effects described in this final determination to an acceptable level.

Neither PLP, the State of Alaska, USACE, nor any other party suggested any additional compensation measures during (1) the initial stakeholder consultation with EPA prior to issuance of the 2022

Proposed Determination, (2) the public comment period on the 2022 Proposed Determination, or (3) final consultation on the recommended determination in December 2022.

4.3.2.1 Overview of Compensatory Mitigation Requirements

Compensatory mitigation refers to the restoration, establishment, enhancement, and/or in certain circumstances preservation of wetlands, streams, or other aquatic resources. Compensatory mitigation regulations jointly promulgated by EPA and USACE state that "the fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by [Clean Water Act Section 404 permits issued by the USACE]" (40 CFR 230.93(a)(1)). Compensatory mitigation enters the analysis only after a proposed project design has incorporated all appropriate and practicable means to avoid and minimize adverse impacts on aquatic resources (40 CFR 230.91(c)).

4.3.2.2 Review of Compensatory Mitigation Plans Submitted by the Pebble Limited Partnership

During the permit review process, PLP submitted two CMPs in an effort to address the project's unavoidable aquatic resource impacts, the first in January 2020 (PLP 2020a) and the second in November 2020 (PLP 2020c). Provided in this section is a discussion of both CMPs and why they failed to adequately address the unacceptable adverse effects that are the subject of this final determination.

Consistent with the CWA Section 404(b)(1) Guidelines, PLP first evaluated whether its project impacts fell within the service area(s)[87] of an approved mitigation bank or in-lieu fee program with appropriate credits available when developing its CMPs. Because mitigation bank and in-lieu fee program options were not available, both of PLP's CMPs involved permittee-responsible compensatory mitigation proposals.[88]

4.3.2.2.1 January 2020 Compensatory Mitigation Plan

PLP's January 2020 CMP included the following three components (PLP 2020a):

1. Improvements to wastewater collection and treatment systems in three villages in the Kvichak River watershed.
2. Rehabilitation of 8.5 miles (13.7 km) of salmon habitat through replacement or removal of some number of unidentified culverts.
3. One-time clean-up of 7.4 miles (11.9 km) of coastal habitat on Kamishak Bay (Cook Inlet).

In an August 20, 2020 letter to PLP, USACE stated "that discharges at the mine site would cause unavoidable adverse impacts to aquatic resources and, preliminarily, that those adverse impacts would

[87] The service area is the watershed, ecoregion, physiographic province, and/or other geographic area within which the mitigation bank or in-lieu fee program is authorized to provide compensatory mitigation (40 CFR 230.98(d)(6)(ii)(A)).

[88] Permittee-responsible mitigation means an aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee to provide compensatory mitigation for which the permittee retains full responsibility (40 CFR 230.92).

result in significant degradation to those aquatic resources" (USACE 2020c: Page 1). Because of its concerns that adverse impacts at the mine site would not be adequately mitigated by the January 2020 CMP, USACE "determined that in-kind compensatory mitigation within the Koktuli River watershed will be required to compensate for all direct and indirect [secondary] impacts caused by discharges into aquatic resources at the mine site" (USACE 2020c: Page 1). In its letter, USACE requested that PLP submit a new CMP that would (1) comply with all requirements of the compensatory mitigation regulations, (2) be "sufficient to offset the unavoidable adverse impacts to aquatic resources" (USACE 2020c: Page 2), and (3) "overcome significant degradation at the mine site" (USACE 2020c: Page 2).

EPA shares USACE's concerns regarding the nature and magnitude of the adverse effects on aquatic resources in the Koktuli River watershed that would result from discharges of dredged or fill material at the mine site. Like USACE, EPA also identified deficiencies in the January 2020 CMP. As discussed here, EPA also does not believe that the January 2020 CMP adequately mitigates the adverse effects of the 2020 Mine Plan that are the subject of this final determination to an acceptable level.

- **Improvements to wastewater collection and treatment systems in three villages in the Kvichak River watershed.** Ninety-four percent of the 2020 Mine Plan's impacts on wetlands, streams, and other aquatic resources occur in the Koktuli River watershed. However, all of these infrastructure projects would occur in other watersheds, and none would address the substantial impacts in the Koktuli River watershed that are the subject of this final determination.[89] Further, such wastewater infrastructure projects would not qualify as acceptable compensatory mitigation under the regulations.[90]

- **Rehabilitation of 8.5 miles (13.7 km) of salmon habitat through replacement or removal of some number of unidentified culverts.** The Koktuli River watershed is an almost entirely roadless area and, thus, offers few, if any, viable culvert replacement or removal opportunities (none are identified in the January 2020 CMP). Therefore, to the extent that such a component would provide any environmental benefits, those benefits would not approach the level necessary to reduce the adverse effects from the discharges of dredged or fill material associated with the 2020 Mine Plan that are the subject of this final determination to an acceptable level.[91]

- **One-time clean-up of 7.4 miles (11.9 km) of coastal habitat on Kamishak Bay (Cook Inlet).** Like the proposed wastewater infrastructure projects, this component does nothing to address the substantial impacts in the Koktuli River watershed that are the subject of this final determination. This component is not even located in the larger Bristol Bay watershed. Further, to the extent that this component provides an environmental benefit, it would be *temporary* and would not address

[89] None of these infrastructure projects would occur in the UTC watershed either, and thus would not address any substantial impacts in that watershed as well.

[90] Such infrastructure construction projects do not meet the definition of compensatory mitigation, which can only occur through four methods: aquatic resource restoration, establishment, enhancement, or in certain circumstances, preservation (40 CFR 230.93(a)(2)).

[91] The UTC watershed is also an almost entirely roadless area, thus this compensation measure would suffer from the same deficiencies if it were applied to address impacts in the UTC watershed.

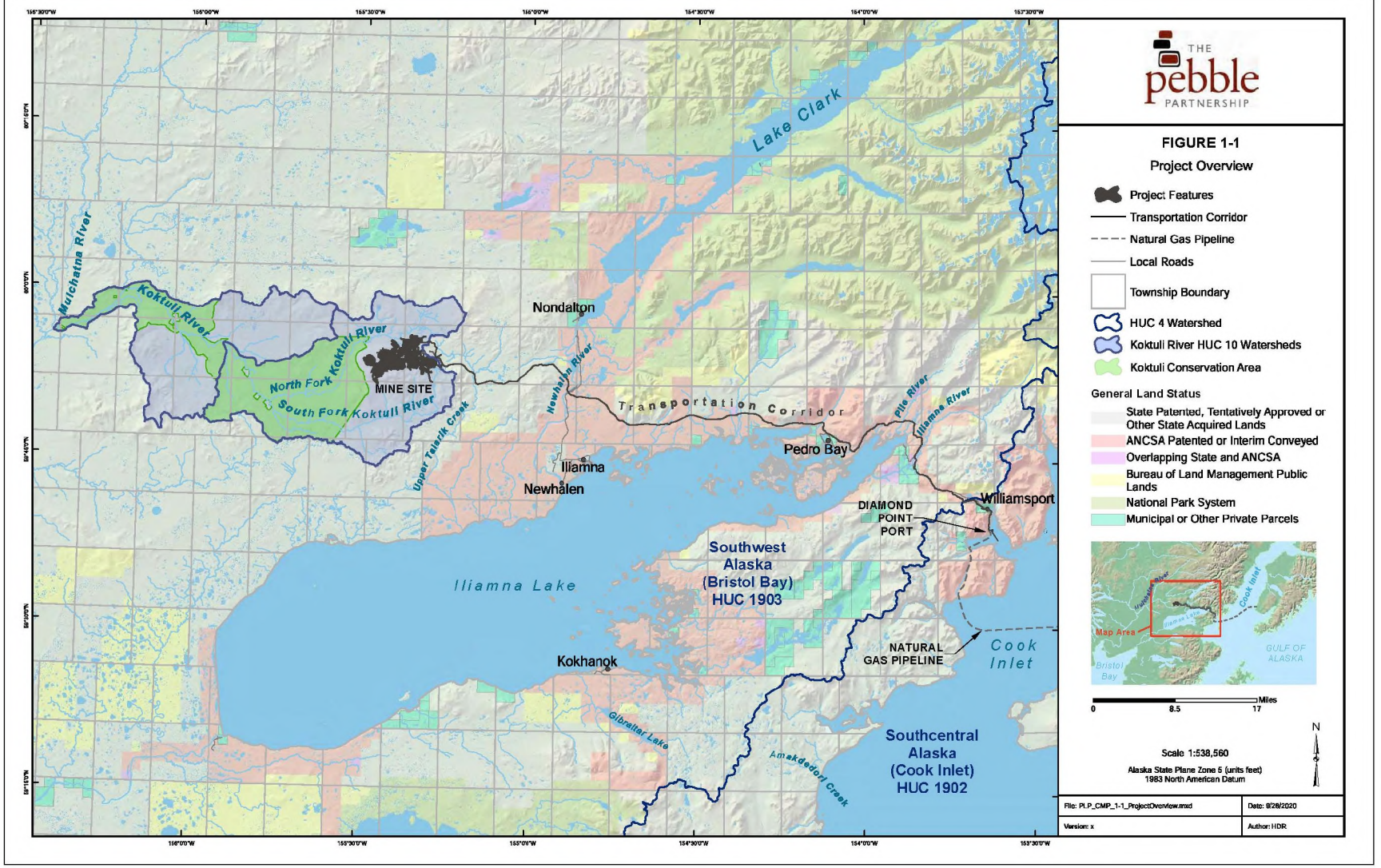
the nature and magnitude of the *permanent* aquatic resource losses at the mine site from construction and routine operation of the 2020 Mine Plan.[92]

4.3.2.2.2 November 2020 Compensatory Mitigation Plan

In response to USACE's August 20, 2020 letter, PLP submitted a new CMP in November 2020 that superseded the January 2020 CMP. When evaluating what compensation measures could reduce the severity of the adverse effects estimated for the Koktuli River watershed, PLP ruled out all other potential measures aside from preservation stating that "[r]estoration, establishment, or enhancement projects within the identified watershed are not plentiful enough in size or scale to mitigate for the identified acreage of direct and indirect impacts to be mitigated; therefore, preservation is the only available compensatory mitigation option" (PLP 2020c: Page 6). The November 2020 CMP includes a single component, proposed preservation of 112,445 acres (455.0 km^2) of state-owned land within the Koktuli River watershed, downstream from the mine site (Figure 4-19). The November 2020 CMP proposed to do this by recording a deed restriction that would limit future uses of the land. The proposed "Koktuli Conservation Area" may contain approximately 31,026 acres (125.6 km^2) of wetlands, lakes, and ponds, and 814 miles (1310 km) of streams (PLP 2020c).

[92] Similarly, this compensation measure would fail to address impacts in the UTC watershed for the same reasons—it is not located in the Bristol Bay watershed and, to the extent that this component provides an environmental benefit, it would be *temporary* and would not address the nature and magnitude of the *permanent* aquatic resource losses at the mine site from construction and routine operation of the 2020 Mine Plan.

Figure 4-19. Proposed Koktuli Conservation Area. Figure 1-1 from PLP's November 2020 Compensatory Mitigation Plan (PLP 2020c).



In its ROD, USACE determined that the November 2020 CMP did not overcome significant degradation at the mine site, and that it failed to comply with all requirements of the compensatory mitigation regulations (USACE 2020b). Specifically, the ROD found the following regulatory compliance deficiencies with the November 2020 CMP and provided the following explanation (USACE 2020b: Attachment B6):

> **Lacks Sufficient Detail-Not Compliant:** The level of detail of the mitigation plan is not commensurate with the scale and scope of the impacts. [33 CFR 332.4(c)(1)]
>
> **Preservation Waiver-Not Compliant:** Preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approach. No restoration, establishment, and/or enhancement were proposed and justification identifying the proposed preservation as a high priority using a watershed approach was not submitted. [33 CFR 332.3(h)(2)]
>
> **Amount of Compensatory Mitigation-Not Compliant:** No compensatory mitigation was proposed by the applicant to offset impacts from the port site. [33 CFR 332.3(f)]
>
> **Site Protection-Not Compliant:** Deed restrictions proposed for 99 years. The goal of 33 CFR 332 is to ensure permanent protection of all compensatory mitigation project sites. Justification not provided as to why a perpetual conservation easement with third-party holder is not practicable. A site protection instrument was not provided; therefore, could not be evaluated. The Final Plan did provide partial deed restriction language; however, the site protection information was not complete, e.g. the Final Plan did not provide the required 60-day advance notification language. No supporting real estate information was submitted; therefore, could not review title insurance, reserved rights, rights-of-way, etc. Baseline information was also not submitted; therefore, could not determine existing disturbances such as roads, culverts, trails, fill pads, etc. USACE cannot enforce the deed restrictions since third-party enforcement rights were not given to USACE. [33 CFR 332.7(a)]
>
> **Maintenance Plan-Not Compliant:** No maintenance plan was submitted. [33 CFR 332.4(c)(8)]
>
> **Performance Standards-Not Compliant:** No ecological performance standards were submitted. Submitted performance standards are administrative in nature, such as the act of monitoring, the act of enforcement, and the act of documentation of the deed restriction requirements. [33 CFR 332.4(c)(9) and 33 CFR 332.5]
>
> **Monitoring-Not Compliant:** One monitoring event is proposed. One event is not sufficient to demonstrate that the compensatory mitigation project has met and maintained performance standards. [33 CFR 332.6]
>
> **Long-Term Management-Not Compliant:** No long-term endowment mechanism was submitted. No supporting information was submitted for cost estimate. Cost estimate did not include items such as capitalization rate, inflationary adjustments, legal defense costs, etc.; therefore, could not determine sufficiency. Long-term manager unclear and unsupported. [33 CFR 332.4(c)(11) and 33 CFR 332.7(d)]
>
> **Financial Assurances-Not Compliant:** No financial assurances were provided. [33 CFR 332.4(c)(13) and 33 CFR 332.3(n)]

Based on its review of the November 2020 CMP, EPA finds that it would not adequately mitigate the adverse effects of the 2020 Mine Plan that are the subject of this final determination to an acceptable level. Deficiencies identified by EPA are as follows:

- **The November 2020 CMP does not qualify as compensatory mitigation under the regulations.** Compensatory mitigation is defined as "the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved" (40 CFR 230.92). The November 2020 CMP "proposes permittee-responsible mitigation in the form of preservation" (PLP 2020c: Page 1). For the proposal to qualify as preservation, it must meet the regulatory definition and requirements for preservation.

  Preservation is defined at 40 CFR 230.92 as "the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources." Preservation is only allowed when the resources to be preserved "are under threat of destruction or adverse modification" (40 CFR 230.93(h)(1)(iv)). Though PLP would give up mining claims within the proposed Conservation Area, development of those claims was not included in the FEIS, the CWA Section 404(b)(1) evaluation, or the Public Interest Review for the 2020 Mine Plan, and it was not considered for development under the Expanded Mine Scenario. Further, the State of Alaska's MCO 393, issued in 1984, already precludes mining in the Koktuli River and 100 feet of its banks within the proposed Koktuli Conservation Area (Section 2.2.1). The primary "threat of destruction or adverse modification" for the proposed Conservation Area comes from the destruction and degradation of streams, wetlands, lakes, and ponds upstream of the Conservation Area at the proposed mine site for PLP's 2020 Mine Plan.

  As discussed in Sections 4.2 and 4.3, discharges at the mine site for the 2020 Mine Plan would result in a number of significant secondary effects that would degrade aquatic resources downstream of the mine site, including the aquatic resources proposed for preservation in the Conservation Area. For example, Sections 4.2 and 4.3.1.1 describe how aquatic resource losses at the mine site would result in the loss or reduction of water, nutrient, detritus, and macroinvertebrate exports to downstream areas, the losses of which would adversely affect downstream food webs and anadromous fish spawning and rearing habitat.

  The November 2020 CMP would not qualify as preservation because it does not involve "the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near" (40 CFR 230.92) the proposed Conservation Area. Indeed, PLP is seeking to obtain as mitigation credit "preserving" aquatic resources that the record shows would be permanently degraded by its own mine plan.

- **The November 2020 CMP does not meet the higher bar for "permanent protection" of preservation sites under the regulations.** The general provisions for site protection in the regulations provide that the "overall compensatory mitigation project must be provided long-term protection through real

estate instruments or other available mechanisms" (40 CFR 230.97(a)(1)). However, preservation can only be used in "certain circumstances," including when the resources to be preserved would be "*permanently protected* through an appropriate real estate or other legal instrument" (emphasis added) (40 CFR 230.93(h)(1)(iv)). The November 2020 CMP proposes to protect the site by recording a 99-year deed restriction on state lands (PLP 2020c). This arrangement is not permanent, and PLP failed to identify a mechanism that would allow it to record a deed restriction over state-owned lands. PLP cannot restrict the uses of state lands and provided no evidence that the State has agreed to do so.

- The November 2020 CMP does not adequately mitigate the unacceptable adverse effects from the 2020 Mine Plan to an acceptable level. As discussed in Sections 4.2 and 4.3.1.1, discharges of dredged or fill material associated with construction and routine operation of the 2020 Mine Plan would result in significant aquatic resource losses and degradation. PLP's November 2020 preservation proposal would not adequately mitigate the adverse effects on anadromous fishery areas to an acceptable level because discharges of dredged or fill material at the mine site would result in secondary effects that would degrade the aquatic resources proposed for preservation and thus would not adequately protect or maintain them. [93]

4.3.2.3 Summary Regarding Compensatory Mitigation Measures

As described in Section 4.2, EPA finds that discharges of dredged or fill material for the construction and routine operation of the 2020 Mine Plan will have unacceptable adverse effects on anadromous fishery areas. EPA evaluated PLP's two compensatory mitigation plans and neither plan adequately mitigates adverse effects described in this final determination to an acceptable level. For informational purposes, EPA also evaluated additional potential compensation measures proposed by PLP and others over the past decade (Appendix C). Available information demonstrates that known compensation measures are unlikely to adequately mitigate effects described in this final determination to an acceptable level (Appendix C).

4.4 Alternative Basis for EPA's Determination

As described in Section 4.1, EPA's longstanding position is that the Agency's determination of "unacceptable adverse effects" under CWA Section 404(c) must be narrowly focused on the significance of adverse effects on the resources enumerated in the statute—municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, and recreational areas. *See* 40 CFR 231.2 ("Unacceptable adverse effect means impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or

[93] This proposed preservation in the Koktuli River watershed would also fail to address any impacts that would occur in the UTC watershed because those impacts would be in an entirely different river basin watershed (i.e., the Kvichak River watershed).

significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas."); 44 Fed. Reg 57,076, at 58,078 (Oct. 9, 1979) ("The term 'unacceptable' in EPA's view refers to the significance of the adverse effect—e.g. is it a large impact and is it one that the aquatic and wetland ecosystem cannot afford."). Under EPA's longstanding position, CWA Section 404(c) does not require the balancing of various adverse and non-adverse factors that are unconnected to the statutory text. *See* 44 Fed. Reg. at 58,078 ("In EPA's view, section 404(c) does not require a balancing of environmental benefits against non-environmental costs such as the benefits of the foregone [*sic*] project.").

The best interpretation of CWA Section 404(c) is that EPA is not required to consider non-environmental costs in making its determination. However, as part of an alternative basis for its action EPA has evaluated those non-environmental costs, including the economic value of the forgone project.

In considering whether the discharges of dredged or fill material evaluated in this final determination will have unacceptable adverse effects on anadromous fishery areas when non-environmental costs are considered, EPA employed a totality-of-the-circumstances analysis to "pay attention to the advantages and disadvantages of [EPA's] decision." *Michigan v. EPA*, 576 U.S. 743, 753 (2015). Under this alternative basis, EPA considered and weighed a broad range of advantages (benefits) and disadvantages (costs), which are described in this final determination and in the document *Consideration of Potential Costs Regarding the Clean Water Act Section 404(c) Final Determination for the Pebble Deposit Area, Southwest Alaska* (EPA 2023b). The Agency has further described its weighing of these considerations in response to public comments (EPA 2023a; see EPA's response to comment 6.F.7). After consideration of the totality of the circumstances, including quantitative and qualitative advantages and disadvantages, EPA has determined that the discharges of dredged or fill material evaluated in this final determination will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds. To the extent that EPA's alternative basis applies, these conclusions and rationale directly support the prohibition described in Section 5.1 and the restriction described in Section 5.2.

After consideration of the totality of the circumstances, including quantitative and qualitative advantages and disadvantages, EPA has determined that the discharges of dredged or fill material evaluated in this final determination will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds. Specifically, EPA has determined that each of the losses or streamflow changes described in Sections 4.2.1 through 4.2.4 independently will have unacceptable adverse effects on anadromous fishery areas if such discharges occur anywhere at the mine site area (Figure 4-1) within the SFK and NFK watersheds or anywhere within the SFK, NFK, and UTC watersheds. In this alternative basis for EPA's unacceptable adverse effects determinations, EPA expressly incorporates the information and findings in Sections 2 through 4 of this final determination. To the extent that EPA's alternative basis applies, these conclusions and rationale directly support the prohibition described in Section 5.1 and the restriction described in Section 5.2.

SECTION 5. FINAL DETERMINATION

Section 404(c) of the CWA authorizes EPA to (1) prohibit or withdraw the specification of any defined area as a disposal site and (2) restrict, deny, or withdraw the use of any defined area for specification as a disposal site whenever it determines that the discharge of dredged or fill material into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas (33 USC 1344(c)).

The following final determination includes two parts. First, EPA prohibits the specification of a defined area as a disposal site for certain discharges (Section 5.1). Second, EPA restricts the use of a defined area for specification as a disposal site for certain discharges (Section 5.2). EPA is exercising its CWA Section 404(c) authority to issue this final determination because it has determined that certain discharges of dredged or fill material into waters of the United States within these defined areas will have unacceptable adverse effects on fishery areas (including spawning and breeding areas).

For the purpose of identifying which discharges of dredged and fill material are subject to the prohibition and restriction, the prohibition and restriction presented below reference the "Pebble deposit." Although the full extent of the Pebble deposit is not yet defined, it is known to extend at least 1.9 by 2.8 miles in area (Ghaffari et al. 2011). For administrative convenience, EPA describes the "Pebble deposit" to encompass its approximate known extent based on publicly available and commonly understood property boundaries, i.e., Public Land Survey System (PLSS) quarter sections (ADNR 2022d), which is depicted as a rectangular area measuring 2.5 miles north–south by 3.5 miles east–west. As illustrated in Figures 5-1, 5-2, and 5-3, this area covers:

> The southeast quarter of Section 17, Township 3 South, Range 35 West, Seward Meridian (S003S035W17); the south half of S003S035W14, S003S035W15, and S003S035W16; the east half of S003S035W20; the entirety of S003S035W21, S003S035W22, S003S035W23, S003S035W26, S003S035W27, and S003S035W28; and the east half of S003S035W29, with corners at approximately latitude 59.917 degrees north (59.917 N) and longitude 155.233 degrees west (155.233 W), latitude 59.917 N and longitude 155.333 W, latitude 59.881 N and longitude 155.333 W, and latitude 59.881 N and longitude 155.233 W.

5.1 Prohibition

The EPA Assistant Administrator for Water has determined that the discharges of dredged or fill material for the construction and routine operation of the mine identified in the 2020 Mine Plan (PLP 2020b) at the Pebble deposit will have unacceptable adverse effects on anadromous[94] fishery areas in

[94] Anadromous fishes hatch in freshwater habitats, migrate to sea for a period of relatively rapid growth, and then return to freshwater habitats to spawn. For the purposes of this final determination, "anadromous fishes" refers

the SFK and NFK watersheds. Based on information in PLP's CWA Section 404 permit application, the FEIS, and the ROD, such discharges would result in the following aquatic resource losses and streamflow changes:

1. The loss of approximately 8.5 miles (13.7 km) of documented anadromous fish streams (Section 4.2.1).
2. The loss of approximately 91 miles (147 km) of additional streams that support anadromous fish streams (Section 4.2.2).
3. The loss of approximately 2,108 acres (8.5 km^2) of wetlands and other waters that support anadromous fish streams (Section 4.2.3).
4. Adverse impacts on approximately 29 additional miles (46.7 km) of anadromous fish streams resulting from greater than 20 percent changes in average monthly streamflow (Section 4.2.4).

EPA has also determined that discharges of dredged or fill material for the construction and routine operation of a mine to develop the Pebble deposit anywhere in the mine site area (Figure 4-1) within the SFK and NFK watersheds that would result in the same or greater levels of loss or streamflow changes as the 2020 Mine Plan also will have unacceptable adverse effects on anadromous fishery areas in these watersheds, because such discharges would involve the same aquatic resources characterized as part of the evaluation of the 2020 Mine Plan.

Sections 4.2.1 through 4.2.4 describe the basis for EPA's determination that each of the above losses and changes to streamflow independently will have unacceptable adverse effects on anadromous fishery areas (including spawning and breeding areas).

Accordingly, the Assistant Administrator for Water prohibits the specification of waters of the United States within the Defined Area for Prohibition, as identified in Section 5.1.1, as disposal sites for the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan. For purposes of the prohibition, the "2020 Mine Plan" is (1) the mine plan described in PLP's June 8, 2020 CWA Section 404 permit application (PLP 2020b) and the FEIS (USACE 2020a); and (2) future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material into waters of the United States within the Defined Area for Prohibition that would result in the same or greater levels of loss or streamflow changes as the mine plan described in PLP (2020b)(i.e., the aquatic resource losses and streamflow changes identified in #1-4 above).[95] Because each of the

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only to Coho or Silver salmon (*Oncorhynchus kisutch*), Chinook or King salmon (*O. tshawytscha*), Sockeye or Red salmon (*O. nerka*), Chum or Dog salmon (*O. keta*), and Pink or Humpback salmon (*O. gorbuscha*).

[95] By clarifying that the "2020 Mine Plan" includes, for the purposes of the prohibition, future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material in the Defined Area for Prohibition that would result in the same or greater levels of loss or streamflow changes as the mine plan described in PLP's June 8, 2020 CWA Section 404 permit application, EPA ensures that future applicants cannot circumvent the prohibition by proposing small changes in the location of discharges within the mine site that would not result in any change to the levels of aquatic resource loss or streamflow change, or that would result in greater levels of aquatic resource loss or streamflow change. In doing so, EPA gives full effect to the purpose of the prohibition to prevent adverse effects at the mine site that EPA has already determined are unacceptable.

losses or streamflow changes described in Sections 4.2.1 through 4.2.4 independently will have unacceptable adverse effects on anadromous fishery areas, future proposals to construct and operate a mine to develop the Pebble deposit that result in any one of these losses or streamflow changes will be subject to the prohibition.

Dredged or fill material need not originate within the boundary of the Pebble deposit defined above to be associated with developing the Pebble deposit and, thus, potentially subject to the prohibition. For additional information regarding applicability of the prohibition, see Box 5-1.

5.1.1 Defined Area for Prohibition

The Defined Area for Prohibition identifies the geographic boundary within which the prohibition applies to waters of the United States. EPA has determined that the discharges of dredged or fill material proposed in PLP (2020b) within the SFK and NFK watersheds will have unacceptable adverse effects on anadromous fishery areas in these watersheds. EPA has also determined that discharges of dredged or fill material associated with developing the Pebble deposit anywhere at the mine site that result in any one of the losses or streamflow changes described in Sections 4.2.1 through 4.2.4 will have unacceptable adverse effects on anadromous fishery areas (Section 4). EPA identified the Defined Area for Prohibition (Figure 5-1) by outlining a contiguous area around the portions of the mine site footprint identified in PLP (2020b) that are located within the SFK and NFK watersheds.

The Defined Area for Prohibition encompasses certain headwaters of the SFK and NFK watersheds. The Defined Area for Prohibition is approximately 24.7 square miles (63.9 km^2) and is delineated by the entirety of the PLSS quarter sections where mine site discharges were proposed in PLP (2020b) within the headwaters of the SFK and NFK watersheds (ADNR 2022d). Use of publicly available and commonly understood property and watershed boundaries to delineate the Defined Area for Prohibition accounts for the clarified scope of the "2020 Mine Plan" and provides clarity and administrative convenience, enabling EPA, USACE, and the public, including future proponents to develop the Pebble deposit, to easily identify the locations of water resources that are subject to the prohibition.

BOX 5-1. APPLICABILITY DATA REQUIREMENTS

EPA must have sufficient information to assess applicability of the determination to proposed discharges of dredged or fill material. Proponents who seek an applicability assessment from EPA must provide to the Agency detailed information about the proposed discharges of dredged or fill material, including, but not limited to, location(s) and characteristics of potentially affected waters. At a minimum, proponents must provide geographic and quantified impact information, including:

- Losses of documented anadromous waters (miles),
- Losses of additional streams (miles),
- Losses of wetlands and other waters (acres), and
- Anadromous fish streams (miles) that would experience changes (percent) to average monthly streamflow.

Estimates must be based on field-verified, project-specific aquatic resource mapping. See Box 4-3 for an example of project-specific stream and wetland mapping information. EPA may request additional information to support the proponent's estimates.

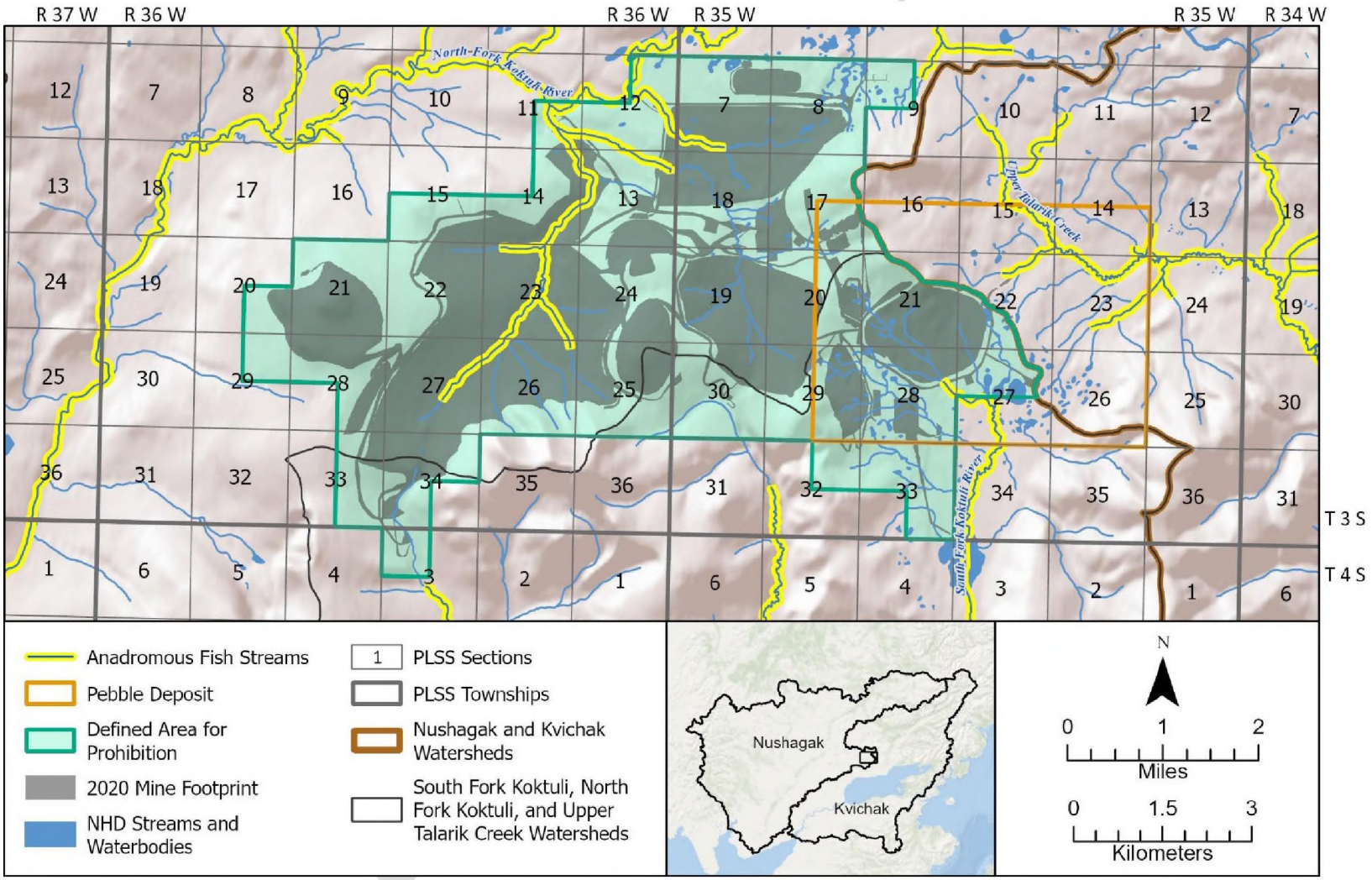
For purposes of this final determination, **Loss**, as in loss of streams, wetlands, or other waters, can result either directly from the discharge of dredged or fill material for the construction and routine operation of a mine to develop the Pebble deposit or indirectly from the secondary effects of such discharges. A loss would result in the following effects for 5 years or more (Box 4-1):

- Elimination of streams, wetlands, or other waters within the footprints of mine components (e.g., TSFs, WMPs, stockpiles, roads, and the open pit),
- Dewatering (see definition below); or
- Fragmentation, meaning creation of discontinuities that separate an aquatic habitat (stream, wetland, lake, pond) or complex of aquatic habitats from the tributary network in such a way that either precludes use (e.g., spawning, rearing, feeding, migration, overwintering) by anadromous fish species and life stages documented to occur in the habitat or eliminates the downstream movement of water or dissolved or suspended materials.

Dewatering includes:

- For documented anadromous waters, removing sufficient flow to eliminate access to or use of habitat for the anadromous fish species and life stages documented to occur in the reach in question;
- For additional streams, removing sufficient flow to eliminate the downstream movement of water or dissolved or suspended materials;
- For ponds or lakes, reducing the spatial extent of the pond or lake; and
- For wetlands, changing the hydrologic regime such that the wetland no longer exhibits wetland hydrology, as defined in the *Corps of Engineers Wetland Delineation Manual* (USACE 1987).

Figure 5-1. The Defined Area for Prohibition. Figure based on information from PLP (2020b), USGS (2021a), and USGS (2021b).



The description of the Defined Area for Prohibition (Figure 5-1) is as follows:

Beginning in the northeast corner at the intersection of the north-south half-section line and the northern boundary of Section 9, Township 3 South, Range 35 West, Seward Meridian (S003S035W09), at approximately latitude 59.938 north (59.938 N) and longitude 155.305 degrees west (155.305 W), it extends 3 miles westward, along the northern boundary of S003S035W09, the entire northern boundaries of S003S035W08 and S003S035W07 to the north-south half-section line of S003S036W12; then south approximately 0.5 mile along the north-south half-section line of S003S036W12 to the east-west half-section line of S003S036W12; then west approximately 1.0 mile along the east-west half-section lines of S003S036W12 and S003S036W11 to the north-south half-section line of S003S036W11; then south approximately 1.0 mile along the north-south half-section line of S003S036W11 and S003S036W14 to the east-west half-section line of S003S036W14; then west approximately 1.5 miles along the east-west half-section lines of S003S036W14 and S003S036W15 to the western boundary of S003S036W15; then south approximately 0.5 mile along the western boundary of S003S036W15 to the northern boundary of S003S036W21; then west approximately 1.0 mile along the northern boundary of S003S036W21 to the western boundary of S003S036W21; then south approximately 0.5 mile along the western boundary of S003S036W21 to the east-west half section line of S003S036W20; then west approximately 0.5 mile along the east-west half-section line of S003S036W20 to the north-south half-section line of S003S036W20; then south approximately 1.0 mile along the north-south half-section line of S003S036W20 and S003S036W29 to the east-west half-section line of S003S036W29; then east approximately 1.0 mile along the east-west half-section line of S003S036W29 and S003S036W28 to the north-south half-section line of S003S036W28; then south approximately 1.5 miles along the north-south half-section line of S003S036W28 and S003S036W33 to the southern boundary of S003S036W33; then east approximately 0.5 mile along the southern boundary of S003S036W33 to the western boundary of S004S036W03; then south approximately 0.5 mile along the western boundary of S004S036W03 to the east-west half-section line of S004S036W03; then east approximately 0.5 mile along the east-west half-section boundary of S004S036W03 to the north-south half-section line of S004S036W03; then north approximately 1.0 mile along the north-south half-section line of S004S036W03 and S003S036W34 to the east-west half-section line of S003S036W34; then east approximately 0.5 mile along the east-west half-section line of S003S036W34 to the eastern boundary of S003S036W34; then north approximately 0.5 mile along the eastern boundary of S003S036W34 to the southern boundary of S003S036W26; then east approximately 3.5 miles along the southern boundaries of S003S036W26, S003S036W25, S003S035W30, and S003S035W29 to the north-south half-section line of S003S035W32; then south approximately 0.5 mile along the north-south half-section line of S003S035W32 to the east-west half-section line of S003S035W32; then east approximately 1.0 mile along the east-west half-section line of S003S035W32 and S003S035W33 to the north-south half-section line of S003S035W33; then south approximately 0.5 mile along the north-south half-section line of S003S035W33 to the southern boundary of S003S035W33; then east approximately 0.5 mile along the southern boundary of S003S035W33 to the eastern boundary of S003S035W33; then north approximately 1.5 miles along the eastern boundary of S003S035W33 and S003S035W28 to the east-west half-section line of S003S035W27; then east approximately 0.84 mile along the east-west half-section line of S003S035W27 to the intersection with the border between the Nushagak and Kvichak watersheds at approximately latitude 59.888 N and longitude 155.266 W; then generally northwest approximately 3.60 miles along the boundary between the Nushagak and Kvichak watersheds to the northernmost intersection of the watershed boundary with the eastern boundary of S003S035W17 at approximately latitude 59.922 N and longitude 155.319 W; then north approximately 0.64 mile along the eastern boundary of S003S035W17 and S003S035W08 to the east-west half-section line of S003S035W09; then east approximately 0.5 mile along the east-west half-section line of S003S035W09 to the north-south half-section line of S003S035W09; then north approximately 0.5 mile along the north-south half-section line of S003S035W09 to the northern boundary of S003S035W09, the initial starting point.

5.2 Restriction

The Assistant Administrator for Water has determined that discharges of dredged or fill material associated with future proposals to construct and operate a mine to develop the Pebble deposit will have unacceptable adverse effects on anadromous fishery areas (including spawning and breeding areas) anywhere in the SFK, NFK, and UTC watersheds if the adverse effects of such discharges are similar or greater in nature[96] and magnitude[97] to the adverse effects of the 2020 Mine Plan described in Sections 4.2.1 through 4.2.4.

Accordingly, the Assistant Administrator for Water restricts the use of waters of the United States within the Defined Area for Restriction, as identified in Section 5.2.1, for specification as disposal sites for the discharge of dredged or fill material associated with future proposals to construct and operate a mine to develop the Pebble deposit that would either individually or cumulatively result in adverse effects similar or greater in nature and magnitude to those described in Sections 4.2.1 through 4.2.4. Because each of the losses or streamflow changes described in Sections 4.2.1 through 4.2.4 independently will have unacceptable adverse effects on anadromous fishery areas, proposals to discharge dredged or fill material that result in any one of these losses or streamflow changes will be subject to the restriction. To the extent that future discharges are subject to the prohibition, the restriction will not apply.

Dredged or fill material need not originate within the boundary of the Pebble deposit defined above to be associated with developing the Pebble deposit and, thus, potentially subject to the restriction. For additional information regarding applicability of the restriction, see Box 5-1 and Section 5.2.2.

5.2.1 Defined Area for Restriction

The Defined Area for Restriction identifies the geographic boundary within which the restriction applies to waters of the United States. EPA has determined that certain discharges of dredged or fill material associated with developing the Pebble deposit will have unacceptable adverse effects on anadromous fishery areas anywhere within the SFK, NFK, and UTC watersheds (Section 4). EPA has identified the Defined Area for Restriction by outlining a contiguous area within the boundaries of the SFK, NFK and UTC watersheds that includes the areas that have the potential to be disposal sites for the discharge of dredged or fill material associated with developing the Pebble deposit.

The Pebble deposit is wholly located within the SFK, NFK, and UTC watersheds. To identify areas within the boundaries of the three watersheds with the potential to be a disposal site for the discharge of dredged or fill material associated with developing the Pebble deposit, EPA identified the location of mine claims in and around the Pebble deposit within the three watersheds. Alaska State law specifically recognizes the opportunity for mineral claims to be converted to leases to use the State's surface land

[96] *Nature* means type or main characteristic (see Cambridge Dictionary available at: https://dictionary.cambridge.org/us/dictionary/english/nature).

[97] *Magnitude* refers to size or importance (see Cambridge Dictionary available at: https://dictionary.cambridge.org/us/dictionary/english/magnitude).

for mining activity, including for a mill site, tailings disposal, or another use necessary for mineral development, making the surface lands above mineral claims areas with potential to be disposal sites for the discharge of dredged or fill material associated with mining.[98] Accordingly, the areas within the boundaries of the three watersheds where mine claims are currently held and areas where mine claims are available (ADNR 2022c) represent locations that have the potential to be a disposal site for the discharge of dredged or fill material associated with developing the Pebble deposit. Use of publicly available and commonly understood property[99] and watershed boundaries to delineate the Defined Area for Restriction provides clarity and administrative convenience by enabling EPA, USACE, and the public, including future proponents to develop the Pebble deposit, to easily identify the locations of water resources that are subject to the restriction.

The Defined Area for Restriction encompasses certain headwaters of the SFK, NFK, and UTC watersheds. The size of the Defined Area for Restriction is approximately 309 square miles (800 km^2). The description of the Defined Area for Restriction (Figures 5-2 and 5-3) is as follows:

> Beginning in the northeast at the intersection between the Upper Talarik Creek, Newhalen River, and Chulitna River watersheds, at approximately latitude 59.955 degrees north (59.955 N) and longitude 154.994 degrees west (154.994 W), it extends generally westward, along the boundary between the Upper Talarik Creek and Chulitna River watersheds to the intersection between the Upper Talarik Creek, Chulitna River, and Koktuli River watersheds, at approximately latitude 59.972 N and longitude 155.193 W; then generally west along the boundary between the Koktuli River and Chulitna River watersheds to approximately latitude 59.979 N and longitude 155.583 W; then generally southward along the boundary between the North Fork Koktuli River and mainstem Koktuli River watersheds, to the south boundary of Section 11, Township 4 South, Range 38 West, Seward Meridian (S004S038W11), at approximately latitude 59.837 N and longitude 155.774 W; then east approximately 0.38 mile along the south section line of S004S038W11 to the north-south half-section line of S004S038W14 at approximately latitude 59.837 N and longitude 155.763 W; then south, approximately 1.5 mile, along the north-south half-section lines of S004S038W14 and S004S038W23 to the center of S004S038W23 at approximately latitude 59.816 N and longitude 155.763 W; then west approximately 1.09 mile along the east-west half-section line of S004S038W23 and S004S038W22 to the boundary between the Upper Koktuli River and Middle Koktuli River subwatersheds at approximately latitude 59.816 N and longitude 155.794 W; then generally southwest, approximately 0.46 mile, along the boundary between the Upper Koktuli River and Middle Koktuli River subwatersheds to the west boundary of S004S038W22 at approximately latitude 59.812 N and longitude 155.806 W; then south along the section line, approximately 0.26 mile, to the south boundary of S004S038W22, at approximately latitude 59.808 N and longitude 155.806 W; then east along the south section line, approximately 1.0 mile to the east boundary of S004S038W27 at approximately latitude 59.808 N and longitude 155.777 W; then south approximately 2.0 miles along the east section line of S004S038W27 and S004S038W34 until the south boundary of S004S038W34 at approximately latitude 59.780 N and longitude 155.777 W; then west along the south section line, approximately 0.04 mile, until the boundary between the Koktuli River and Stuyahok River watersheds at approximately latitude 59.780 N and longitude 155.778 W; then generally southeast, approximately 0.59 mile, along the watershed boundary between the Koktuli River and Stuyahok River watersheds until the intersection between the Koktuli River, Stuyahok River, and Kaskanak Creek watersheds at approximately latitude 59.775 N and longitude 155.764 W; then generally east along the boundary between the Koktuli River and Kaskanak Creek watersheds, approximately 4.14 miles, to the north boundary of S005S037W06 at approximately latitude 59.780 N and longitude 155.645 W; then east, approximately 0.09 mile, along the north section line of S005S037W06 to the north-south half-section

[98] 11 Alaska Administrative Code 86.600.

[99] The boundaries of mine claims are defined by the PLSS (ADNR 2022d).

line of S005S037W06 at approximately latitude 59.780 N and longitude 155.642 W; then south along the north-south half-section line of S005S037W06, approximately 0.07 mile, to the boundary between the Koktuli River and Kaskanak Creek watersheds at approximately latitude 59.778 N and longitude 155.642 W; then generally eastward, along the watershed boundary between the Koktuli River and Kaskanak Creek watersheds until the intersection between the Koktuli River, Kaskanak Creek, and Iliamna Lake watersheds at approximately latitude 59.767 N and longitude 155.541 W; then generally eastward, along the boundary between the Koktuli River and Iliamna Lake watersheds to the intersection of the Koktuli River, Iliamna Lake, and Upper Talarik Creek watersheds at approximately latitude 59.762 N and longitude 155.363 W; then generally southeastward, along the boundary between the Upper Talarik Creek and Iliamna Lake watersheds, to the south boundary of S005S036W24, at approximately latitude 59.722 N and longitude 155.329 W; then east along the south section line approximately 0.52 mile to the east section line of S005S036W24, at approximately latitude 59.722 N and longitude 155.314 W; then north along the section line 1.0 mile to the south boundary of S005S035W18, at approximately latitude 59.736 N and longitude 155.314 W; then east along the south section line 2.0 miles to the east boundary of S005S035W17, at approximately latitude 59.736 N and longitude 155.259 W; then north approximately 1.0 mile along the east section line of S005S035W17 to the south boundary of S005S035W09, at approximately latitude 59.751 N and longitude 155.259 W; then east approximately 1.0 mile along the south section line of S005S035W09 to the east section line of S005S035W09, at approximately latitude 59.751 N and longitude 155.230 W; then north approximately 1.0 mile along the east section line of S005S035W09 to the south boundary of S005S035W03, at approximately latitude 59.765 N and longitude 155.230 W; then east approximately 1.0 mile along the south section line of S005S035W03 to the east section line of S005S035W03, at approximately latitude 59.765 N and longitude 155.202 W; then north approximately 1.0 mile along the east section line of S005S035W03 to the south boundary of S004S034W31, at approximately latitude 59.780 N and longitude 155.202 W; then west approximately 0.09 mile along the south section line of S004S034W31 to the west section line of S004S034W31, at approximately latitude 59.780 N and longitude 155.204 W; then north approximately 2.0 miles along the west section line of S004S034W31 and S004S034W30, to the south boundary of S004S034W19, at approximately latitude 59.808 N and longitude 155.204 W; then east approximately 1.0 mile along the south section line of S004S034W19 to the east section line of S004S034W19, at approximately latitude 59.808 N and longitude 155.176 W; then north approximately 1.0 mile along the east section line of S004S034W19 to the south boundary of S004S034W17, at approximately latitude 59.823 N and longitude 155.176 W; then east approximately 3.0 miles along the south section lines of S004S034W17, S004S034W16, and S004S034W15 to the east boundary of S004S034W15, at approximately latitude 59.823 N and longitude 155.090 W; then north approximately 2.0 miles along the east section line of S004S034W15 to the south boundary of S004S034W02, at approximately latitude 59.852 N and longitude 155.090 W; then east approximately 2.64 miles along the south section lines of S004S034W02, of S004S034W01, and of S004S033W06 to the boundary between the Upper Talarik Creek and Newhalen River watersheds, at approximately latitude 59.852 N and longitude 155.014 W; then generally north along the watershed boundary until the east boundary of S003S034W12 at approximately latitude 59.936 N and longitude 155.032 W; then north approximately 1.15 mile along the section line to the south boundary of S002S033W31 at approximately latitude 59.953 N and longitude 155.032 W; then east approximately 1.23 mile along the section line to the boundary between the Upper Talarik Creek and Newhalen River watersheds, at approximately latitude 59.953 N and longitude 154.997 W; then generally north, approximately 0.17 mile, along the watershed boundary to the starting point, at the intersection between the Upper Talarik Creek, Newhalen River, and Chulitna River watersheds (coordinates above).

Figure 5-2. The Defined Area for Restriction and Defined Area for Prohibition overlain on wetlands from the National Wetlands Inventory (USFWS 2021).

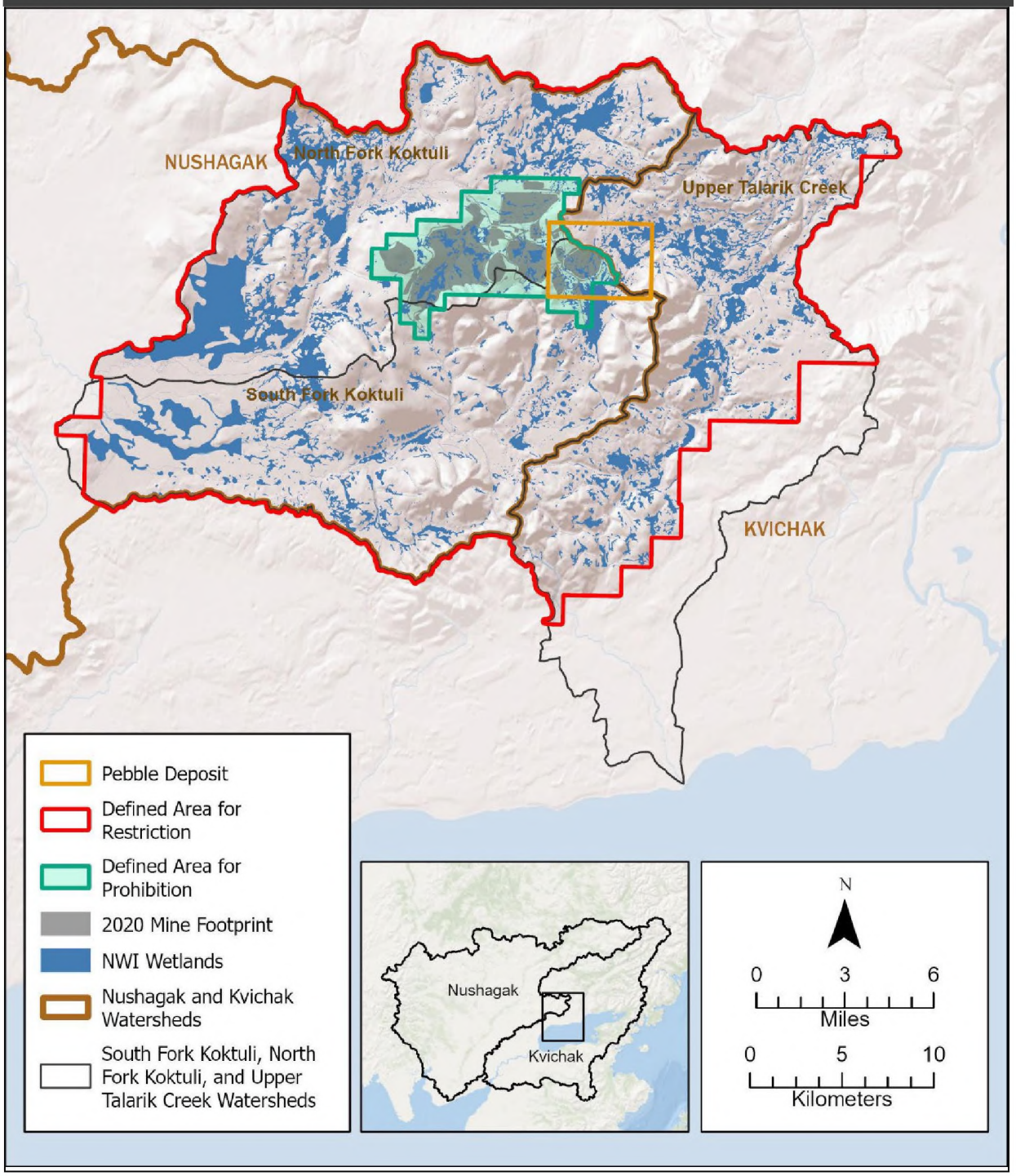
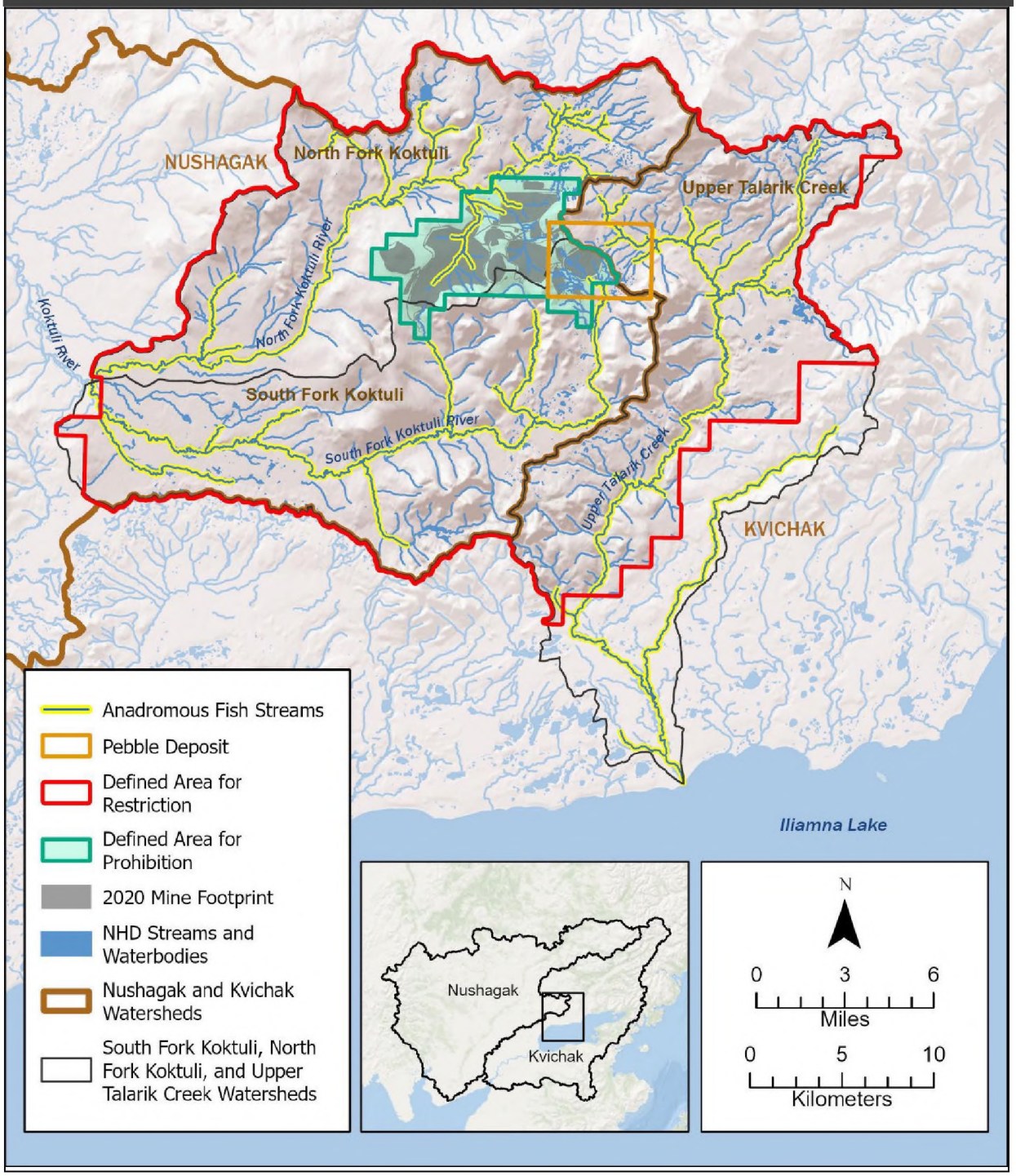


Figure 5-3. The Defined Area for Restriction and Defined Area for Prohibition overlain on streams and waterbodies from the National Hydrography Dataset (USGS 2021b).



5.2.2 Applicability of the Restriction

The restriction applies to proposed discharges of dredged or fill material into waters of the United States associated with developing the Pebble deposit within the Defined Area for Restriction if such discharges would result in adverse effects similar in nature and magnitude to the adverse effects of the discharges described in Sections 4.2.1 through 4.2.4. The restriction also applies to proposed discharges if such discharges would result in adverse effects greater in nature and magnitude than the adverse effects of the discharges described in Sections 4.2.1 through 4.2.4.

Discharges of dredged or fill material within the Defined Area for Restriction associated with developing the Pebble deposit would individually be subject to the restriction if such discharges, from a single proposal, would result in any one of the losses or streamflow changes found in Sections 4.2.1 through 4.2.4. Discharges of dredged or fill material within the Defined Area for Restriction associated with developing the Pebble deposit would cumulatively be subject to the restriction if the effects of such discharges together with other discharges within the Defined Area for Restriction associated with developing the Pebble deposit combine to result in any one of the losses or streamflow changes described in Sections 4.2.1 through 4.2.4 in the SFK, NFK, and UTC watersheds. In evaluating whether the restriction would apply on a cumulative basis, EPA will consider losses and streamflow changes associated with developing the Pebble deposit that have occurred or that are authorized to occur. The restriction would apply to discharges of dredged or fill material associated with developing the Pebble deposit cumulatively whether multiple proposals are submitted by the same entity, such as when discharges are proposed over multiple phases of the same project, or by different entities.

To evaluate whether a future proposal involves discharges that "would either individually or cumulatively result in adverse effects" such that it would be subject to the restriction, EPA will verify and then compare the estimates of losses of anadromous fish streams; losses of additional streams, wetlands, and other waters that support anadromous fish streams; and changes to streamflow of anadromous fish streams to assess whether the estimated losses and streamflow changes are similar to or greater than the losses or changes identified in Section 4.2, specifically:

- The loss of approximately 8.5 miles of documented anadromous fish streams (Section 4.2.1),
- The loss of approximately 91 miles of additional streams that support anadromous fish streams (Section 4.2.2),
- The loss of approximately 2,108 or more acres of wetlands and other waters that support anadromous fish streams (Section 4.2.3), or
- Adverse impacts to approximately 29 miles of anadromous fish streams resulting from greater than 20 percent changes in average monthly streamflow (Section 4.2.4).

Specifically, EPA will review:

- The location(s) of the proposed discharges, including whether the location is within the Defined Area for Restriction;
- The location(s) of the waters that will be impacted, including whether the location is within the SFK, NFK, and UTC watersheds;
- The type(s) of waters that will be impacted (e.g., streams, lakes, ponds, wetlands) and whether such waters are documented anadromous fish streams or support anadromous fish streams; and
- The type(s) of water resource impact(s) (e.g., habitat losses caused by elimination, dewatering, and fragmentation; degradation of downstream habitat caused by streamflow changes) and the duration of impact(s) (Box 5-1).

The restriction will apply if any one of the estimated losses or streamflow changes from the proposed discharges are similar or greater to those described in Section 4.2. The restriction is based on the determinations in Section 4.2 that these losses and streamflow changes will have unacceptable adverse effects. In evaluating applicability of the restriction, EPA will evaluate all proposed discharges associated with developing the Pebble deposit that would occur within the Defined Area for Restriction.

5.3 When a Proposal is Not Subject to this Determination

Proposals to discharge dredged or fill material into waters of the United States associated with developing the Pebble deposit that are not subject to this determination remain subject to all statutory and regulatory authorities and requirements under CWA Section 404.

In light of the immense and unique economic, social, cultural, and ecological value of the aquatic resources in the region, including the fishery areas in the SFK, NFK, and UTC watersheds, and their susceptibility to damage, EPA will carefully evaluate all future proposals to discharge dredged or fill material in the region.

SECTION 6. OTHER CONCERNS AND CONSIDERATIONS

The basis for EPA's final determination is the unacceptable adverse effects on fishery areas from certain discharges of dredged or fill material associated with proposed mining at the Pebble deposit, which is discussed in detail in Section 4. This section describes additional concerns and information that, while not the basis for EPA's final determination, are related to discharges of dredged or fill material associated with developing the Pebble deposit.

6.1 Other Potential CWA Section 404(c) Resources

CWA Section 404(c) authorizes EPA to exercise its discretion to act whenever it determines that the discharge of dredged or fill material will have an unacceptable adverse effect on specific aquatic resources. CWA Section 404(c) provides the following:

> The Administrator is authorized to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site, and he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines, after notice and opportunity for public hearings, **that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas**. Before making such determination, the Administrator shall consult with the Secretary. The Administrator shall set forth in writing and make public his findings and his reasons for making any determination under this subsection. [33 USC 1344(c)] [emphasis added]

Section 4 of this final determination considers the adverse effects from the discharge of dredged or fill material on fishery areas. Section 6.1 evaluates the potential for adverse effects on wildlife, recreation, and water supplies.

6.1.1 Wildlife

Unlike most terrestrial ecosystems, the Bristol Bay watershed has undergone little development and remains largely intact. Thus, it still supports its historical complement of species, including large carnivores, such as brown bears, bald eagles, and gray wolves; ungulates such as moose and caribou; and numerous bird species. For example, more than 40 mammal species are thought to regularly occur in the Nushagak and Kvichak River watersheds (Brna and Verbrugge 2013). At least 13 of these species are known, or have the potential based on the presence of suitable habitat, to occur in the SFK, NFK, and UTC watersheds: brown bear, moose, caribou, gray wolf, red fox, river otter, wolverine, arctic ground squirrel, red squirrel, beaver, northern red-backed vole, tundra vole, and snowshoe hare (PLP 2011: Chapter 16). One of two freshwater harbor seal populations in North America is found in Iliamna Lake (Smith et al. 1996).

As many as 134 species of birds occur in the Nushagak and Kvichak River watersheds (Brna and Verbrugge 2013), and at least 37 waterfowl species have been observed in the SFK, NFK, and UTC watersheds, 21 of which have been confirmed as breeders (PLP 2011: Chapter 16). The region's aquatic habitats support migratory and wintering waterfowl. These habitats include an important staging area for many species, including emperor geese, Pacific brant, and ducks, during spring and fall migrations. Twenty-eight landbird and 14 shorebird species have also been documented in the SFK, NFK, and UTC watersheds (PLP 2011: Chapter 16). The Bristol Bay watershed supports millions of marine birds throughout the year and is one of the world's most productive areas for marine birds (Warnock and Smith 2018). Two areas in the region, Kvichak Bay and Nushagak Bay, are designated as Western Hemisphere Shorebird Reserve Network sites (WHSRN 2022a, 2022b). The FEIS identifies bird species protected under the Migratory Bird Treaty Act of 1918, the Bald and Golden Eagle Protection Act, and bird species of concern within its mine site analysis area (USACE 2020a: Section 4.23).

Species found in the Nushagak and Kvichak River watersheds may have home ranges or migration patterns that extend beyond the watersheds as well (e.g., brown bears, caribou, and migratory birds). Several bird species found within the watersheds are considered species of special concern and are already experiencing population declines due to climate change effects on their preferred foraging fish (USACE 2020b). Within the Nushagak and Kvichak River watersheds, there are no known breeding or otherwise significant occurrences of any species listed as threatened or endangered under the Endangered Species Act, nor is there any designated critical habitat.

Wildlife present in the SFK, NFK, and UTC watersheds—several of which are essential subsistence species (Section 6.3.1)—would likely be adversely affected by large-scale mining at the Pebble deposit. Direct impacts of mining on resident and migratory wildlife species would include, but are not limited to, loss of terrestrial and aquatic habitat, reduced habitat effectiveness (e.g., in otherwise suitable habitats adjacent to the mine area), habitat fragmentation, increased stress and avoidance due to noise pollution, and increased conditioning on human food (EPA 2014: Chapter 12). Direct habitat loss and secondary habitat avoidance would affect the Mulchatna Caribou Herd (USACE 2020b), an important subsistence resource and prey species for wolves and brown bears (EPA 2014: Chapter 12). Brown bears, which are an important recreation species in the region, would experience direct loss of foraging and denning habitat. Impacts on wildlife habitat and consequential wildlife displacement would likely result in a cascading effect, as species compete for new feeding, breeding, and nesting habitats (USACE 2020b). Direct copper toxicity to wildlife resulting from mine operations is less of a concern than indirect effects from copper-related reductions in aquatic communities (EPA 2014: Chapter 12).

In addition to direct mine-related effects, wildlife species would also likely be affected indirectly via any reductions in salmon populations. Marine-derived nutrients imported into freshwater systems by spawning salmon provide the foundation for the region's aquatic and terrestrial foodwebs, via direct consumption of salmon in any of its forms (spawning adults, eggs, carcasses, or juveniles) and nutrient recycling (e.g., transport and distribution of marine derived nutrients from aquatic to terrestrial environmental by wildlife) (Section 3.3.4). Availability and consumption of these salmon-derived resources can have significant benefits for terrestrial mammals and birds, including increases in growth

rates, litter sizes, nesting success, and population densities (Brna and Verbrugge 2013). Waterfowl prey on salmon eggs, parr, and smolts and scavenge salmon carcasses. Carcasses are an important food source for bald eagles, water birds, other land birds, other freshwater fishes, and terrestrial mammals. Aquatic invertebrate larvae also benefit from carcasses and are an important food source for water birds and land birds. Decomposing salmon acts as an organic input to streambed substrate (Cederholm et al. 1999). It is likely that the species identified above would be adversely affected by any mine-related reductions in salmon production.

The FEIS identifies direct and indirect impacts to wildlife that could result at the proposed mine site, including behavioral disturbances, injury and mortality, and habitat changes. Noise and the presence of humans, vehicles, aircraft, and other equipment could result in avoidance of the mine site by wildlife throughout construction, operations, and closure. Mortality of, and injury to, wildlife at the proposed mine site could occur due to vegetation clearing; collisions with vehicles, equipment, and structures; defense of life and property; altered predator and prey relationships; changes in water quality; nest abandonment and/or disturbance; exposure to contaminants; and possible spills. The FEIS estimates the direct loss of 8,390 acres of habitat and the indirect loss of additional habitat surrounding the mine site due to avoidance, which would occur throughout the life of the project and longer in areas that are not restored. Wildlife habitat may also see long-term changes due to the introduction or spread of invasive species, changes in water quality and air quality, and potential spills (USACE 2020a: Section 4.23).

The Expanded Mine Scenario would contribute to cumulative effects of wildlife habitat loss, disturbance, injury, and mortality. The FEIS estimates that 31,541 acres of habitat would be lost at the expanded mine site, as well as additional habitat surrounding the expanded mine site due to avoidance (USACE 2020a: Section 4.23).

The FEIS provides more detailed information not summarized in this final determination regarding other potential direct, indirect, and cumulative impacts that may result from the 2020 Mine Plan and the Expanded Mine Scenario, including species-specific information in some cases.

6.1.2 Recreation

Next to commercial salmon fishing and processing, recreation is the largest private economic sector in the Bristol Bay region (EPA 2014: Appendix E) due mainly to the watershed's remote, pristine wilderness setting and abundant natural resources. Key recreational uses include sport fishing, sport hunting, and other tourism/wildlife viewing recreational trips—all of which are directly or indirectly dependent on the intact, salmon-based ecosystems of the region. Direct regional expenditures on these recreational uses, expressed in terms of 2021 dollars,[100] are estimated at more than $210 million (EPA 2014: Table 5-4). Much of these expenditures are by non-residents, highlighting the fact that the recreational value of Bristol Bay watershed is recognized even by people that live a significant distance from the region. Total visitors to the Bristol Bay region are estimated at 40,00 to 50,000 people annually (McKinley Research Group 2021). In 2019, tourism spending in the Bristol Bay region generated $155

[100] Values adjusted using Anchorage Consumer Price Index.

million in total economic output and 2,300 jobs in Alaska. Recreation in the region diversifies the region's economy through the use of sustainable resources (McKinley Research Group 2021).

In particular, the abundance of large game fishes makes the region a world-class destination for recreational anglers. The 2005 Bristol Bay Angler Survey confirmed that the freshwater rivers, streams, and lakes of the region are a recreational resource equal or superior in quality to other world-renowned sport fisheries (EPA 2014: Appendix E). In 2009, sport anglers took approximately 29,000 sport-fishing trips to the Bristol Bay region (12,000 trips by people living outside of Alaska, 4,000 trips by Alaskans living outside of the Bristol Bay area, and 13,000 trips by Bristol Bay residents) (EPA 2014: Chapter 5). These sport-fishing activities directly employed over 800 full- and part-time workers. At peak times, 92 businesses and 426 guides have operated in the Nushagak and Kvichak River watersheds alone (EPA 2014: Chapter 5). More than 90 lodges and camps operate in the Bristol Bay region, primarily focusing on sport fishing and bear viewing. Lodge and camp guests spent an estimated $77 million in 2019 (McKinley Research Group 2021).

Much of the sport fishery in the region is relatively low-impact catch-and-release, although there is some recreational harvest. Sockeye, Chinook, and Coho salmon are the predominant fishes harvested, although Rainbow Trout, Dolly Varden, Arctic Char, Arctic Grayling, Northern Pike, Chum Salmon, Lake Trout, and whitefish are also important recreational species (Dye and Borden 2018). From 2007 to 2017, the total annual recreational harvest in the Bristol Bay Management Area ranged from roughly 42,000 to 59,000 fish (Dye and Borden 2018). In 2017, an estimated 30,282 Rainbow Trout were caught and 241 Rainbow Trout were harvested in the Nushagak, Wood, and Togiak River watersheds. The same year, an estimated 114,431 Rainbow Trout were caught and 66 Rainbow Trout were harvested in the Kvichak River watershed (Table 3-12) (Romberg et al. 2021).

Sport fishing in the Bristol Bay region is a large and well-recognized share of recreational use and associated visitor expenditures (Section 3.3.7). In addition, thousands of trips to the region each year are made for sport hunting and wildlife viewing. For example, Lake Clark and Katmai National Parks are nationally significant protected lands and are important visitor destinations. Between 2012 and 2021, Katmai National Park and Preserve attracted an average of 41,139 visitors annually, and Lake Clark National Park and Preserve averaged 15,728 visitors annually (NPS 2022). Rivers within Katmai National Park provide the best locations in North America to view wild brown bears (EPA 2014: Appendix E). A 2019 study found that activities related to bear viewing resulted in approximately $34.5 million in sales and $10 million in direct wages and benefits in Southcentral Alaska, and that bear viewing opportunities are "inextricably linked" to Lake Clark and Katmai National Parks (Young and Little 2019). The region is also used for recreational water activities, hiking, backpacking, biking, flightseeing, and other activities, especially in Katmai National Park and Preserve and Lake Clark National Park and Preserve (USACE 2020a: Section 4.5).

Sport hunting for caribou, moose, brown bear, and other species also plays a role in the local economy of the Bristol Bay region. In recent years, approximately 1,323 non-residents and 1,319 non-local residents of Alaska traveled to the region to hunt, spending approximately $6,395 (non-residents) and $1,631

(non-local residents) per trip (expressed in 2021 dollars[101]), respectively (EPA 2014: Chapter 5). These hunting activities result in an estimated $10 million per year in direct hunting-related expenditures (values expressed in 2021 dollars[102]) and directly employ over 100 full- and part-time workers (EPA 2014: Chapter 5).

The 2020 Mine Plan would result in the permanent alteration and loss of 8,391 acres of land at the mine site that are currently available for recreation, including the loss of 2,113 acres of wetlands and other waters that support fish and wildlife and attract recreational anglers and hunters (USACE 2020a: Section 4.5). As described in Section 4.2.1.1, the 2020 Mine Plan would permanently remove 8.5 miles (13.7 km) of streams with documented occurrence of Coho and Chinook salmon, disrupting the spawning cycle and displacing spawners. The substantial spatial and temporal extents of stream habitat losses under the 2020 Mine Plan suggest that these losses would reduce the overall capacity and productivity of Chinook and, particularly, Coho salmon in the NFK watershed. The Nushagak River—to which the SFK and NFK flow—supports the largest Chinook Salmon sport fishery in the United States and, in turn, a network of private and commercial sport-fishing camps overseen by Choggiung, Ltd., the Alaska Native village Corporation for Dillingham, Ekuk, and Portage Creek (NMWC 2007, Choggiung, Ltd. 2014, Dye and Borden 2018). The loss of habitat at the mine site would affect downstream trout habitat, possibly displacing trout and, therefore, anglers (USACE 2020a: Section 4.6). The FEIS acknowledges the potential for economic impacts borne by recreational anglers and affiliated guides and lodges, stating that "affected operators could substitute fishing on different streams, albeit at potentially higher costs to themselves and their consumers" (USACE 2020a: Page 4.6-12).

The FEIS indicates that the mine site itself does not support much recreational use, though construction, operations, and closure of the mine site would affect recreational activities on surrounding lands, including Lake Clark National Park and Katmai National Park (USACE 2020a, 2020b). Noise and the presence of humans, vehicles, aircraft, and other equipment is likely to result in avoidance of the mine site by wildlife that support recreational uses. Changes to the landscape due to visibility of the mine and night sky light pollution would alter the recreational experience for visitors and potentially displace recreation visitors and activities to other areas. These impacts together would reduce the opportunities for solitude (USACE 2020a: Section 4.5). Further, there exists the possibility of a loss in recreational visitors and activity in areas not impacted by the 2020 Mine Plan resulting from the perceived loss of habitat or fishery quality due to the construction and operation of the mine (Glasgow and Train 2018, English et al. 2019, Glasgow and Train 2019).

The Expanded Mine Scenario, which would extend impacts in the SFK and UTC watersheds, would contribute to cumulative effects similar in nature to those described above but over a larger area. The larger mine footprint would further displace wildlife and increase the amount of disturbance in the NFK

[101] Values adjusted using Anchorage Consumer Price Index.
[102] Values adjusted using Anchorage Consumer Price Index.

and SFK watersheds, reducing opportunities for hunting, fishing, and wildlife viewing (USACE 2020a: Section 4.5).

6.1.3 Public Water Supplies

Alaska Native residents of the Nushagak and Kvichak River watersheds consistently stress the importance of clean water to their way of life, not only in terms of providing habitat for salmon and other fishes, but also in terms of providing high-quality drinking water (EPA 2014: Appendix D). Drinking water sources in the region include municipal treated water, piped but untreated water, individual wells, and water hauled directly from rivers and lakes (EPA 2014: Appendix D, Table 3).

At this time, it is difficult to determine what level of effects routine operations of a mine at the Pebble deposit could have on public water supplies in the Nushagak and Kvichak River watersheds. Private wells are a primary drinking water source for many residents of the Nushagak and Kvichak River watersheds, and communities also rely on groundwater for their public water supply. The extent that surface water influences the quality or quantity of the groundwater source for these wells is unknown. However, there are also communities in the area that rely on surface water sources, which may be more susceptible to mine-related contamination. Although no communities are currently located in the SFK, NFK, or UTC watersheds (Figure ES-2), residents of nearby communities use these areas for subsistence hunting and fishing and other activities and may drink from surface waters and springs in these watersheds.

Development of a large-scale mine at the Pebble deposit would require a work force of more than 1,700 people during construction and more than 850 people during mine operation (USACE 2020a: Chapter 2). Thus, the mine site would rival Dillingham as the largest population center in the Bristol Bay watershed during construction and would remain the second-largest population center during operation. This population would require sufficient water supplies in the Pebble deposit region, and these supplies would be vulnerable to contamination or degradation resulting from mine development and operation. The 2020 Mine Plan includes installation of groundwater wells on the northern side of the mine site to supply potable water (USACE 2020a: Section 3.18).

Other public water supplies (e.g., at Iliamna, Newhalen, and Pedro Bay) could be affected by construction of and transport along a roadway and/or pipelines connecting the Pebble deposit region to Cook Inlet. The Safe Drinking Water Act requires states and utilities to assess the source water for public water systems, and there are CWA provisions designed for protecting source waters from contamination. The ADEC Drinking Water Program has delineated drinking water source protection areas for all public water system sources and includes areas along the proposed transportation corridor, the region surrounding Iliamna Lake, and the adjacent communities. Currently, there are no designated drinking water protection areas for private wells in Newhalen, Iliamna, and other villages along the transportation corridor, nor at the mine site (USACE 2020a: Section 3.18).

6.2 Effects of Spills and Failures

This final determination does not consider impacts from potential spills, accidents, and failures as a basis for its findings; however, as discussed in this section there is a likelihood that some spills would occur over the life of the mining operation. A recent report documenting spills that have occurred at Alaska mining operations found that more spills, particularly transportation-related spills, occurred than were predicted in the EISs for these mining operations (Lubetkin 2022). The report did not document the cleanup actions that occurred for these spills, or the resulting environmental impacts. Failure of major infrastructure (e.g., concentrate and tailings pipelines, water treatment plants, or TSF dams), while less likely, could result in severe impacts on aquatic resources in the SFK, NFK, and UTC watersheds.

The FEIS and the BBA evaluated potential impacts of an array of possible accidents and failures that could result in releases and spills of concentrate, tailings, and contaminated water, including their potential effects on fishery areas (EPA 2014, USACE 2020a). This section summarizes the potential impacts of mine area spill scenarios on aquatic resources that were evaluated in the FEIS and also summarizes the potential impacts of a tailings dam failure.

6.2.1 Final Environmental Impact Statement Spill and Release Scenarios

The FEIS evaluates the spill risk associated with the 2020 Mine Plan, including spills and releases of diesel fuel, natural gas, chemical reagents, copper-gold flotation concentrate, tailings, and untreated contact water (USACE 2020a: Section 4.27). The FEIS includes a detailed analysis of seven hypothetical spill scenarios that would generally have a low probability of occurring, but with potential environmental consequences that could be high. Some of the scenarios considered in the FEIS are vehicle and marine transportation-related and are not mentioned here because this final determination focuses on the mine site impacts. The spill scenarios analyzed in the FEIS applicable to the mine site include a spill of concentrate slurry, a bulk tailings release from the tailings delivery pipeline, and a partial breach of the pyritic tailings impoundment that results in a pyritic tailings release. The FEIS evaluates potential environmental impacts of these spill scenarios and uncertainties. A summary of the potential environmental impacts of these scenarios on aquatic resources is provided below.

6.2.1.1 Release of Concentrate Slurry from the Concentrate Pipeline

The copper-gold flotation concentrate that would be produced under the 2020 Mine Plan would be composed of a slurry containing finely ground rock and mineral particles that have been processed from the mined ore to concentrate the economic minerals containing copper and gold. The concentrate particles in the slurry would be potentially acid generating (PAG) and capable of metal leaching over time, depending on conditions. The concentrate slurry would also contain approximately 45 percent mine contact water, which would have elevated concentrations of metals, including copper, and residual amounts of chemical reagents. Under the 2020 Mine Plan, the concentrate would be transported from the mine site to the port site by a pipeline. The FEIS evaluates the potential impacts due to a release of

concentrate slurry from the pipeline. The concentrate slurry release scenario was based on historic spill data and a statistical evaluation of probabilities. The FEIS estimates a concentrate pipeline failure rate of 0.013, which equates to a probability of one or more pipeline failures of 1.3 percent in any given year; 23 percent in 20 years; or 64 percent in 78 years.

The analysis in the FEIS determines that a concentrate slurry spill into flowing waters could have the following impacts on water quality, aquatic resources, and subsistence, commercial, and recreational fisheries users (extent and magnitude of impacts would depend on the size of the spill and spill response actions):

- If a concentrate spill occurs to flowing water, the concentrate would be difficult to recover and would be transported downstream. The distance downstream would depend on the amount and location of the release but could extend into Iliamna Lake.
- Concentrate solids would cause a temporary increase in total suspended solids (TSS) and sedimentation to downstream waters.
- Potential impacts to fish from increased TSS and sedimentation include decreased success of incubating salmon eggs; reduced food sources for rearing juvenile salmon; modified habitat; and in extreme cases, mortality to eggs and rearing fish in the immediate area of the spill.
- Contact water contained in the concentrate slurry would result in exceedances of water quality criteria for copper and other metals.
- Sulfide minerals in the concentrate slurry would slowly dissolve in the subaqueous environment over years to decades and result in metal leaching. The dissolved metals in the aqueous phase of the concentrate slurry could have acute impacts to the aquatic environment that would likely be temporary and localized, but would depend on the size of the release.
- A concentrate spill into flowing water could temporarily displace recreational angling efforts in the vicinity of the spill if the event or cleanup occurred during the open water fishing season.
- A concentrate release would likely cause concerns over contamination for local subsistence users.

6.2.1.2 Tailings Releases

Tailings are the leftover mixture of ground ore and process water following separation of the copper-gold concentrate and molybdenum concentrate. Processing associated with the 2020 Mine Plan would result in the production of two separate tailings waste streams: bulk tailings and pyritic tailings. Approximately 88 percent of the tailings would be bulk tailings and approximately 12 percent would be pyritic tailings. The bulk tailings would consist of tailings that are primarily non-acid generating. The pyritic tailings would have a high level of PAG minerals.

The bulk tailings would be transported by pipeline to a bulk TSF. The pyritic tailings would be transported by a pipeline to a pyritic TSF. Table 6-1 lists some of the key features of the TSFs.

Table 6-1. Summary description of Tailings Storage Facilities.

TSF	Design Features
Bulk TSF	• 1.1 billion tons of tailings would be disposed in the bulk TSF. • Tailings would be thickened before disposal in the TSF. • TSF would have a minimal supernatant pool (pond) during operations. • TSF would have two embankments (dams). The main dam would be 13,700 ft long and 545 ft high. The south dam would be 4,900 ft long and 300 ft high. • The main dam would be a flow-through design and would be constructed using the centerline method. • The south dam would be constructed using downstream method and would be lined on the upstream face. • At closure, the TSF would be covered and allowed to dewater with the goal of becoming a stable landform.
Pyritic TSF	• 155 million tons of pyritic tailings and up to 93 million tons of PAG waste rock would be stored in the pyritic TSF. • TSF would have a full water cover during operations. • TSF would have three dams. The south dam would be 4,500 ft long and 215 ft high. The north dam would be 335 ft high and the east dam 225 ft high with combined length of 2,500 ft. • These dams would be constructed using the downstream method. • Impoundment would be fully lined. • At closure, the pyritic tailings and waste rock would be backfilled into the open pit.

Source: USACE 2020a.

The FEIS evaluates the potential environmental impacts associated with two hypothetical tailings release scenarios, including a release of 1.56 million cubic feet of bulk tailings associated with shearing of the tailings delivery pipelines and a partial breach of the pyritic tailings facility embankment that would result in a release of 185 million cubic feet of tailings and pond water. These scenarios were based on an EIS-Phase Failure Modes Effects Analysis (FMEA) risk assessment that was conducted by USACE. The FEIS determines that tailings releases under these scenarios could result in the following impacts:

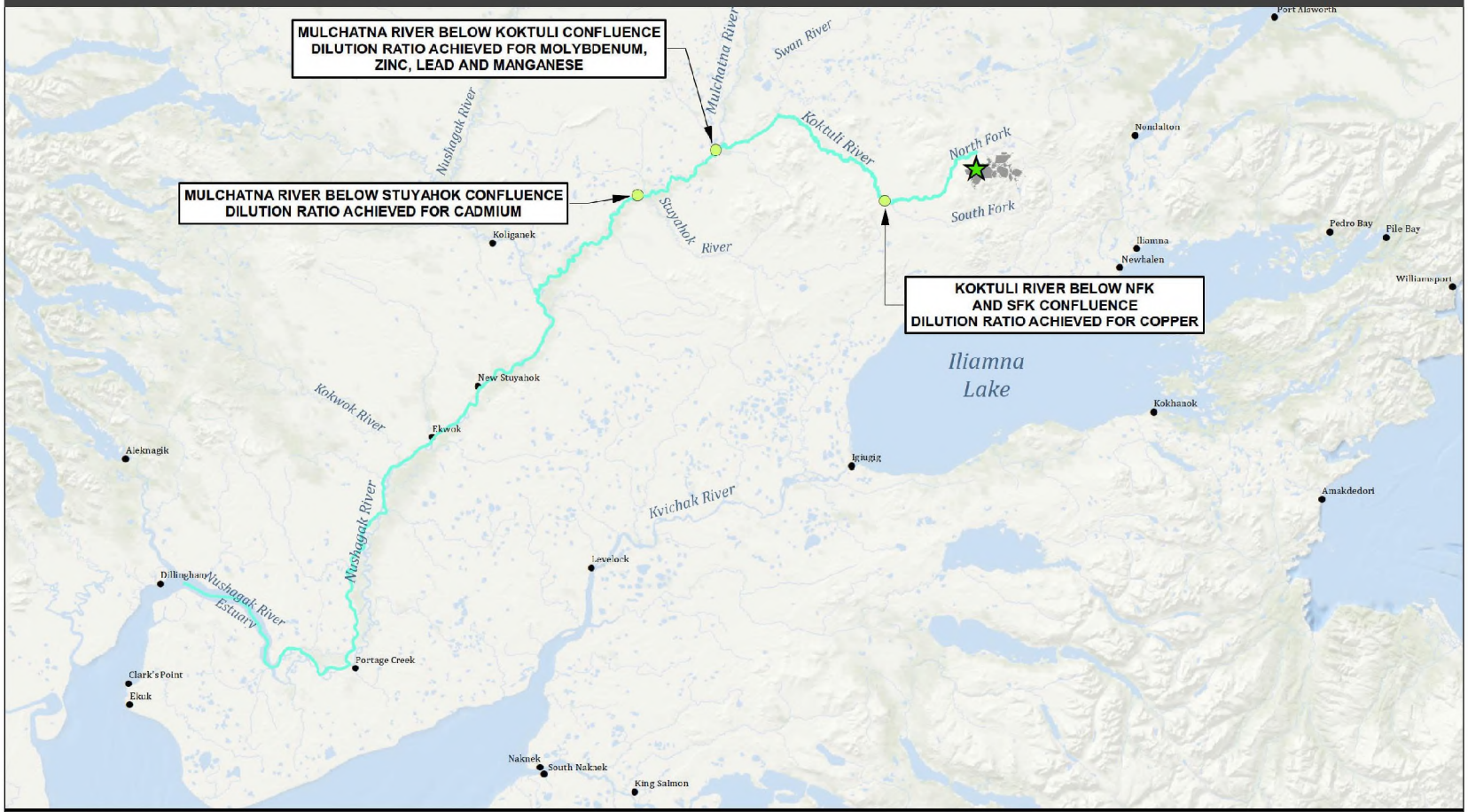
- Under both tailings release scenarios, most of the fine tailings particles would be transported downstream, causing elevated TSS in exceedance of water quality criteria (WQC) for approximately 230 miles downstream as far as the Nushagak River Estuary, where the river feeds into Nushagak Bay. Additional TSS would be generated due to ongoing erosion and sedimentation from potential stream destabilization during the release floods and could persist for months to years, depending on the speed and effectiveness of stream reclamation efforts that would control streambed erosion.
- Tailings fluids (contact water used to mix the bulk tailings slurry and pyritic supernatant fluid) would contain concentrations of some metals that exceed WQC. The dissolved metals would be transported downstream and diluted to various degrees, depending on stream flow. Metals with the highest concentrations would continue to exceed WQC for tens of miles downstream. The estimated extent of impacts for the specific scenarios modeled in the FEIS are as follow:
    - Bulk tailings release: Copper concentrations would exceed the most stringent WQC to the Koktuli River below the NFK and SFK confluence, about 23 miles downstream from the mine site. Molybdenum, zinc, lead, and manganese concentrations would exceed the most stringent WQC until the Mulchatna River below the Koktuli River confluence, about 62 miles downstream. Cadmium concentrations would exceed the most stringent WQC until the Mulchatna River below the Stuyahok River confluence, about 78 miles downstream from the mine site. The modeled extent of elevated metals for this scenario is shown in Figure 6-1.

  - Pyritic tailings release: Copper would remain at levels exceeding the most stringent WQC until the Mulchatna River below the Koktuli River confluence, about 80 miles downstream of the mine site. Zinc, lead, and manganese would remain at levels exceeding the most stringent WQC until the Nushagak River below the Mulchatna River confluence, about 122 miles downstream of the mine site. Cadmium and molybdenum would remain at levels exceeding the most stringent WQC as far downstream as the Nushagak River Estuary, about 230 miles downstream from the mine site.

- Fish and other aquatic organisms would be simultaneously affected by the elevated TSS and metals concentrations in the water, leading to physical injury, loss of habitat and food, and lethal metals toxicity. In the short term, and immediately downstream of the spill, lethal acute metal toxicity may occur in fish species and other sensitive aquatic species. Over days to weeks in downstream locations, sub-lethal effects, such as impairment of olfaction, behavior, and chemo/mechanosensory responses, may also occur in these receptors, specifically due to copper. Impacts from elevated metals could last for 5 to 6 weeks after the pyritic release scenario, while TSS impacts could last for months to years, depending on the effectiveness of stream restoration efforts.
- Although predicted mercury concentrations in tailings are low, even very low amounts of total mercury could result in bioaccumulation and biomagnification in fishes.
- Commercial fishing could be affected, depending on impacts to fish in the affected drainages. Recreational anglers fishing these waters could experience a temporary reduction in harvest rates or catch per unit effort rates if the sub-lethal effects reduced target species' ability or desire to feed or strike at anglers' lures.
- Tailings spills could cause psychosocial stress resulting from community anxiety over a tailings release, particularly in areas of valued subsistence and fishing activities. There could be exposures to potentially hazardous materials, including metals, particularly in the pyritic tailings release. Subsistence users may choose to avoid the area and alter their harvest patterns, due to actual and potential perceptions of subsistence food contamination that extend throughout the area.

In the event of a tailings release, efforts would be made to recover tailings. A small release near the mine site could be recoverable. However, once tailings are actively transported downstream full recovery efforts may not be practicable or possible. This issue is discussed further in Section 6.2.2.

Figure 6-1. Modeled extent of elevated metals downstream of bulk tailings release. Figure 4.27-4 from the FEIS (USACE 2020a: Section 4.27)



6.2.1.3 Untreated Contact Water Release

Untreated contact water is surface water or groundwater that has been in contact with mining infrastructure or mining wastes. Under the 2020 Mine Plan, contact water would be stored in several facilities, including the main WMP, the open pit WMP, and six seepage collection ponds downstream of the TSFs. The main WMP is the largest water storage facility and would include a 750- to 825-acre reservoir contained by a 150-ft-high embankment. According to the FEIS, the main WMP would be among the largest lined water storage reservoirs in the world. The FEIS predicts that contact water would contain elevated levels of several metals in exceedance of WQC. The FEIS evaluates a scenario of a slow release of untreated contact water from the main WMP over a month for a total release of 5.3 million cubic feet into the NFK. The scenario was developed by USACE based on the EIS-Phase FMEA. The FEIS determines that the release could result in the following impacts:

- Untreated contact water released into the downstream drainages would contain elevated levels of aluminum, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc in exceedance of the most stringent aquatic life WQC. The released untreated contact water would be diluted by stream water as it flows downstream, yet some metal concentrations could remain elevated above WQC for up to 45 miles downstream of the mine site; exceedances would last through the duration of the release.
- Impacts to fish from the release of untreated contact water would be similar to those described for elevated metal impacts from the pyritic tailings release scenario. Acute toxicity due to metals would not likely occur; however, prolonged exposure to metal concentrations in slight exceedance of WQC may result in sub-lethal effects.
- Commercial fishing could be affected, depending on impacts to fish in the affected drainages. Recreational anglers fishing these waters could experience a temporary reduction in harvest rates or catch-per-unit effort rates if the sub-lethal effects reduced target species' ability or desire to feed or strike at anglers' lures.
- Subsistence users may choose to avoid the area and alter their harvest patterns. Spills of untreated contact water could cause psychosocial stress, particularly in areas of valued subsistence and fishing activities.

6.2.2 Tailings Dam Failure

While the FEIS assesses impacts of a partial breach of the pyritic TSF, as discussed above, it does not quantify or model the extent of impacts that could be caused by a catastrophic failure of the pyritic or bulk TSF dams. USACE determined that a full breach analysis was not necessary because it determined that the probability that a full breach could occur is very remote based on the tailings management plans and TSF designs.

However, EPA believes there could be uncertainty with this conclusion due to the conceptual nature of the TSF designs, potential future changes to the TSF water balances due to climate change, the

possibility that design or operational changes could occur during implementation, and the very long time frames over which the bulk TSF dams would need to be maintained. In addition, the FEIS identifies that there is uncertainty associated with the ability of the bulk tailings to drain sufficiently, which would result in the majority of the tailings remaining in a saturated condition and a higher phreatic surface than assumed in the main dam drainage design. The FEIS identifies that this could be monitored during operations and corrected by changes to designs of future dam raises. The FEIS acknowledges that the common factor in all major TSF failures has been human error, including errors in design, construction, operations, maintenance, and regulatory oversight. Even well-designed dams can fail due to human errors during construction or operations. FEIS Appendix K4.27 includes a review of recent tailings dam failures including Mount Polley (Canada, 2014), Fundao (Brazil, 2015), Cadia (Australia, 2018), and Feijao (Brazil, 2019). Some of these failures have caused severe environmental damage and fatalities. It is possible that the 2020 Mine Plan TSF failure probabilities are very low as described in the FEIS (USACE 2020a: Section 4.27). However, due to the uncertainties described above and in the FEIS, the public interest in this issue, and the likely severe environmental consequences of a failure, EPA believes that it is appropriate to describe potential impacts of a failure scenario.

EPA evaluated potential dam failure scenarios in the BBA. The quantitative aspects of the BBA scenarios are not applicable to the 2020 Mine Plan due to differences in the TSF designs and assumptions. However, some of the general conclusions regarding the potential for severe impacts on aquatic resources if such an event were to occur are still applicable. In addition, the FEIS contains a general discussion of the fate and behavior of released tailings from which a potential range of impacts can be discerned.

Failure of the bulk TSF main dam would result in the release of a thickened tailings slurry into the NFK. The FEIS estimates that a release from the bulk TSF main dam would travel only about 2.2 miles downstream due to the thickened nature of the tailings. However, as noted above, it is possible that the tailings could remain saturated, which would result in more fluidized conditions and would travel further. In addition, the FEIS notes that slumping can occur and that upon entering a flowing stream, tailings particles would become entrained in the water and be carried further downstream. Failure of any of the fluid-filled pyritic TSF dams would result in a flood of water and tailings slurry, which could move far downstream.

Tailings slurry releases can result in the following effects:

- Spilled tailings would bury habitat and streamflow would transport some of the spilled tailings downstream, where further deposition would occur, burying stream substrate and altering habitat.
- Tailings entrained in water would create turbid water conditions and sedimentation downstream. Upstream erosion would also contribute to ongoing downstream turbidity and sedimentation.
- Downstream sedimentation and elevated TSS and turbidity would continue until spilled tailings are recovered, naturally flushed out of the drainage, or incorporated into the bedload. Complete recovery of spilled tailings is not possible, because tailings spilled in flowing water would be widely

dispersed. If no tailings were recovered or if the volume of release was extremely high, decades to centuries may be required to naturally flush tailings out of the drainages.

- Metals could leach from unrecovered tailings on a timescale of years to decades. Metals that accumulate in streambed sediments could adversely affect water quality on a timescale of decades.
- The bulk tailings fluid contains antimony, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, selenium, zinc, total dissolved solids, hardness, and sulfate in exceedance of WQC. Water quality characteristics of the pyritic TSF fluids are discussed in Section 6.2.1. Elevated metals and other constituents contained in released tailings process fluids would affect water quality downstream. Released fluids would be diluted by stream water, but streams could fail to meet WQC for many miles downstream. Depending on the volume and the rate of release, the downstream water quality would be in exceedance of WQC for an unknown length of time and an unknown distance before the released fluid is sufficiently diluted below WQC.
- Deposited tailings would severely degrade habitat quality for fishes and the invertebrates they eat due to extensive smothering effects. In addition, based largely on their copper content, deposited tailings would be toxic to benthic macroinvertebrates; existing data concerning toxicity to fishes are less clear.
- The affected streams would provide low-quality spawning and rearing habitat for decades.
- Recovery of suitable substrates via mobilization and transport of tailings would take years to decades and would affect much of the watershed downstream of the failed dam.
- For some years, periods of high streamflow would be expected to suspend sufficient concentrations of tailings to cause avoidance, reduced growth and fecundity, and even death of fishes.
- Loss of NFK fishes downstream of the TSF and additional fish losses in the mainstem Koktuli, Nushagak, and Mulchatna Rivers would be expected to result from these habitat losses.

The extent of water quality changes and habitat and fisheries losses due to failure of any of the TSF dams would depend on many factors, including when the breach occurs during the operational life of the facility, the amount of tailings released, the water content of the tailings, the speed and duration of release, seasonality (winter vs spring/summer conditions), and failure mode. However, the extent of impacts would go much further beyond the extent of the bulk TSF pipeline release and pyritic TSF partial breach described in the FEIS and summarized in Section 6.2.1, and the duration of impacts would be much longer. The USACE ROD acknowledges that although the probability of a full dam breach is low, the consequences would be high and catastrophic failure could have severe and irreversible impacts to subsistence, commercial, and recreational fisheries. USACE states "In the event of human error and/or a catastrophic event, the commercial and/or subsistence resources would be irrevocably harmed, and there is no historical scientific information from other catastrophic events to support restoration of the fishery to its pre-impacted state" (USACE 2020b: Page B3-27).

6.3 Other Tribal Concerns

EPA's policy is to consult on a government-to-government basis with federally recognized tribal governments whenever EPA actions and decisions may affect tribal interests, consistent with Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*.[103] Consultation is a process of meaningful communication and coordination between EPA and tribal officials. Separately, pursuant to Public Law 108-199, 118 Stat. 452, as amended by Public Law 108-447, 118 Stat. 3267, EPA is required to consult and engage with Alaska Native Corporations on the same basis as tribes under Executive Order 13175.[104]

Throughout development of the BBA (EPA 2014: Chapter 1), the 2014 Proposed Determination, and the 2017 proposal to withdraw the 2014 Proposed Determination, EPA Region 10 provided opportunities for consultation and coordination with federally recognized tribal governments, as well as consultation and engagement with Alaska Native Corporations. On all actions, EPA invited all 31 Bristol Bay tribal governments and all 26 Alaska Native Corporations in Bristol Bay to participate.

On January 27, 2022, consistent with Executive Order 13175 and EPA Region 10 Tribal Consultation and Coordination Procedures (EPA 2012), EPA Region 10 invited all 31 Bristol Bay tribal governments to participate in consultation. Separately, it also invited consultation with 5 Alaska Native Corporations and offered engagement to 21 Alaska Native Corporations with lands in the Bristol Bay watershed. EPA Region 10 hosted three informational webinars for tribal governments and one informational webinar for Alaska Native Corporations to review the CWA Section 404(c) process and answer questions. In addition, EPA Region 10 engaged in multiple consultations with tribal governments and Alaska Native Corporations from February through October 2022. EPA's Office of Water continued the tribal consultation process initiated by EPA Region 10 for this CWA Section 404(c) action. The Assistant Administrator for Water engaged in multiple consultations with tribal governments and Alaska Native Corporations in January 2023. A summary of EPA's tribal consultation process can be found in the docket for this effort at www.regulations.gov, see docket ID No. EPA-R10-OW-2022-0418.

This section describes additional concerns and information that may affect tribal interests regarding potential effects of discharges of dredged or fill material associated with developing the Pebble deposit on subsistence use, traditional ecological knowledge (TEK), and environmental justice.

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[103] In May 2011, EPA issued the *EPA Policy on Consultation and Coordination with Indian Tribes*, which established national guidelines and institutional controls for consultation. In October 2012, EPA Region 10 issued the EPA Region 10 Tribal Consultation and Coordination Procedures, which established regional procedures for the consultation process. On January 26, 2021, President Biden issued the Presidential Memorandum, *Tribal Consultation and Strengthening Nation-to-Nation Relationships*, which charges each federal agency to engage in regular, meaningful, and robust consultation and to implement the policies directed in Executive Order 13175.

[104] As described in EPA's *Guiding Principles for Consulting with Alaska Native Claims Settlement Act Corporations* (EPA 2021), it is EPA's practice to consult with Alaska Native Corporations on a regulatory action that has a substantial direct effect on an Alaska Native Corporation and imposes substantial direct compliance costs and to notify Alaska Native Corporations of impending agency actions that may be outside of the scope of consultation.

6.3.1 Subsistence Use and Potential Mining Impacts

The use and importance of subsistence fisheries in the Nushagak and Kvichak River watersheds and the SFK, NFK, and UTC watersheds are discussed in detail in Section 3.3.6. Although salmon and other fish provide the largest portion of subsistence harvests for Bristol Bay communities, non-fish resources make up a significant portion of subsistence use (Table 6-2). On average, non-fish resources, such as moose, caribou, waterfowl, plants, and other organisms represent just over 30 percent of subsistence harvests by local communities (Table 6-2). The relative importance of non-fish subsistence resources varies throughout the Bristol Bay watershed, and per capita subsistence harvest of non-fish resources exceeds fish harvests in two communities (Table 6-2).

Table 6-2. Harvest of subsistence resources for communities in the Nushagak and Kvichak River watersheds.

Community	Year	Total Harvest (pounds) [a]	Estimated Per Capita Harvest (pounds)		
			All Resources	Fish	Non-Fish Resources
Aleknagik	2008	51,738	296	169	127
Dillingham	2010	486,533	212	138	74
Ekwok	1987	77,268	793	524	269
Igiugig	2005	22,310	541	264	277
Iliamna	2004	34,160	469	404	65
Kokhanok	2005	107,644	680	549	131
Koliganek	2005	134,779	898	655	243
Levelock	2005	17,871	527	192	335
New Stuyahok	2005	163,927	389	216	173
Newhalen	2004	86,607	692	534	158
Nondalton	2004	58,686	357	253	104
Pedro Bay	2004	21,026	305	265	40
Port Alsworth	2004	14,489	133	101	32

Notes:

[a] Total harvest values represent usable weight and include fishes, land mammals, freshwater seals, beluga, other marine mammals, plant-based foods, birds or eggs, and marine invertebrates.

Sources: Schichnes and Chythlook 1991 (Ekwok); Fall et al. 2006 (Iliamna, Newhalen, Nondalton, Pedro Bay, and Port Alsworth); Krieg et al. 2009 (Igiugig, Kokhanok, Koliganek, Levelock, New Stuyahok); Holen et al. 2012 (Aleknagik); Evans et al. 2013 (Dillingham).

Numerous studies on TEK have been completed for the Nushagak and Kvichak River watersheds.[105] These studies provide extensive information from villages in the watersheds, including primary and secondary subsistence species, subsistence use areas and critical habitat, subsistence practices, and observed changes in abundance and timings for subsistence species (Boraas and Knott 2013). For example, the *Nushagak River Watershed Traditional Use Area Conservation Plan* identifies that the species most integral to subsistence were all five species of Pacific salmon, whitefish, winter freshwater fish, moose, caribou, waterfowl, and edible and medicinal plants. The plan also identified probable threats to the watershed and identified as one of its strategic actions "prevent[ing] habitat damage that

[105] Boraas and Knott (2013) summarized additional studies in Appendix D of the BBA (EPA 2014).

could result from mining" (NMWC 2007: Page 3). Section 6.3.2 provides more information about the role of TEK in the Bristol Bay watershed.

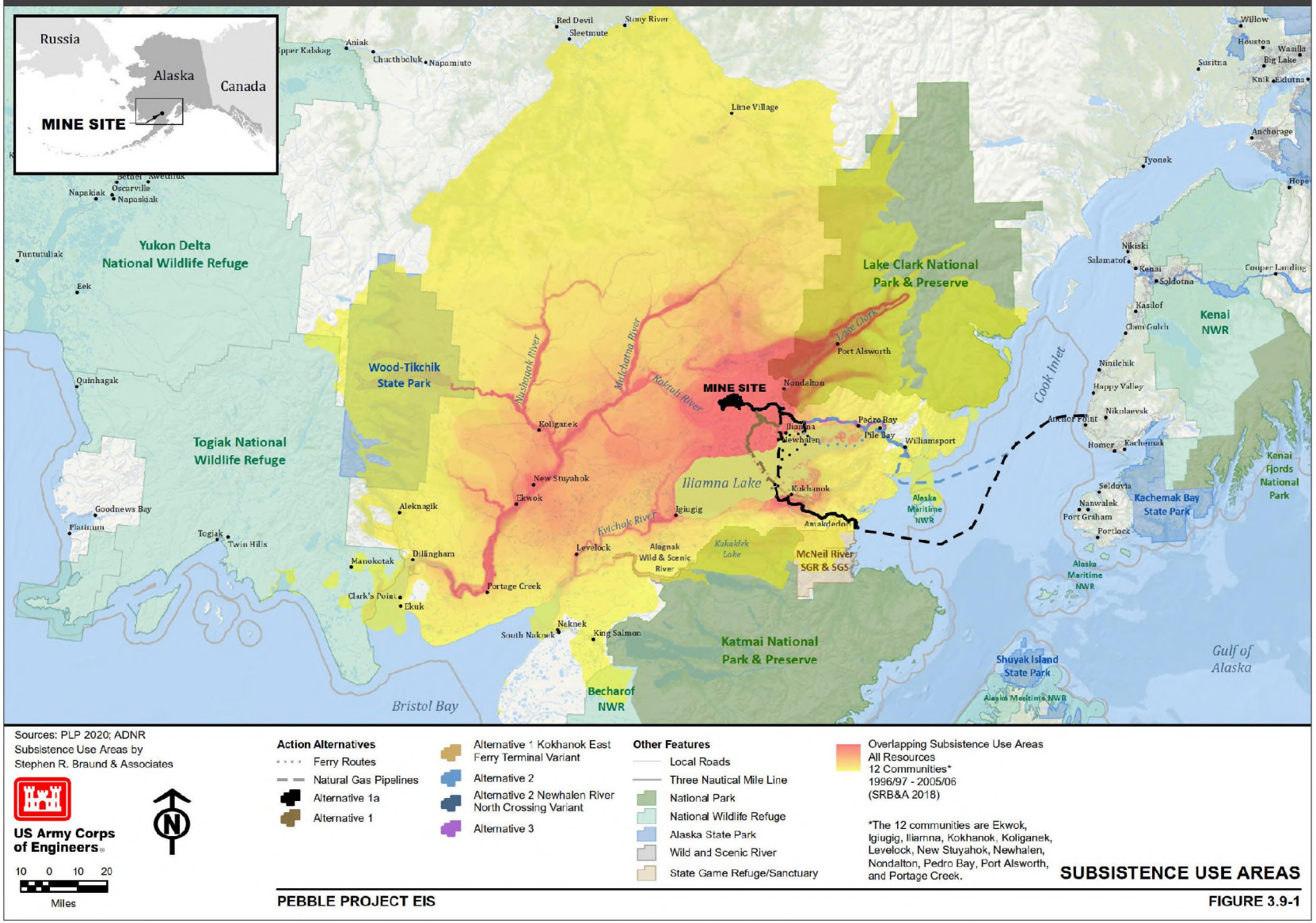
Figure 6-2 highlights areas of subsistence use for fish, wildlife, and waterfowl in the Nushagak and Kvichak River watersheds as identified in the FEIS (USACE 2020a: Table 3.9-1). Subsistence use patterns do not follow watershed boundaries, and communities outside the Nushagak and Kvichak River watersheds also rely on these areas for subsistence resources. For example, Clark's Point subsistence use areas for caribou and moose overlap with the Nushagak and Kvichak River watersheds; South Naknek, Naknek, and King Salmon subsistence use areas for waterfowl, moose, and berry picking, as well as caribou search areas, overlap both watersheds, particularly the Kvichak (Holen et al. 2011). Subsistence data are coarse and incomplete, and it is likely that subsistence activities occur outside the areas identified in Figure 6-2. In addition, Figure 6-2 indicates only use, not abundance or harvest.

Section 4 of the FD provides the basis for EPA's determination that discharges of dredged or fill material from developing the Pebble deposit will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds. All subsistence resources could be directly affected by discharges associated with the identified mining activities, for example, via habitat destruction or modification of habitat use by different subsistence species. In addition, non-salmon subsistence resources could be indirectly affected by any adverse effects on salmon fisheries that result from discharges associated with the mine; as explained in Section 3.3, the loss or reduction of salmon populations would have repercussions on the productivity of the region's ecosystems.

Any effects on fish—particularly salmon—and other subsistence resources that result from discharges associated with the mine could have significant adverse effects on the Bristol Bay communities that rely on these subsistence foods (EPA 2014: Chapter 12). Given the nutritional and cultural importance of salmon and other subsistence foods to Alaska Native populations, these communities would be especially vulnerable to impacts to subsistence resources; however, non-Alaska Native populations in the region also rely heavily on subsistence resources.

As discussed in EPA (2014) and Section 4 above, routine development and operation of a large-scale mine at the Pebble deposit would likely affect salmon and other important fish resources in the Nushagak and Kvichak River watersheds. The FEIS confirms that the 2020 Mine Plan would result in adverse impacts to the availability of and access to subsistence resources (USACE 2020a: Section 4.9). Although no subsistence salmon fisheries are documented directly in the 2020 proposed mine site, subsistence use of the mine area is high and centers on hunting caribou and moose and trapping small mammals (PLP 2011: Chapter 23). Tribal Elders have expressed concerns about ongoing mine exploration activities directly affecting wildlife resources, especially the caribou herd range (EPA 2014: Appendix D). Tribal members and subsistence hunters have anecdotally reported to EPA that noise during the exploration phase of the Pebble deposit has already disturbed moose populations and altered caribou migration patterns (EPA 2018).

Figure 6-2. Subsistence use intensity for salmon, other fishes, wildlife, and waterfowl within the Nushagak and Kvichak River watersheds. Figure 3.9-1 from the FEIS (USACE 2020a: Section 3.9).



Negative impacts to downstream fisheries from headwater disturbance (Section 4) could affect subsistence fish resources beyond the 2020 Mine Plan footprint. Those residents using the upper reaches of the SFK, NFK, and UTC rivers downstream of the mine footprint for subsistence harvests would be most affected. Access to subsistence resources is also important. A reduction in downstream seasonal water levels caused by mine-related withdrawals during and after mine operation could pose obstacles for subsistence users who depend on water for transportation to fishing, hunting, gathering, or other culturally important areas.

Changes in subsistence resources may affect the health, welfare, and cultural stability of Alaska Native populations in several ways (EPA 2014: Appendix D):

- The traditional diet is heavily dependent on wild foods. If fewer subsistence resources were available, diets would move from highly nutritious wild foods to increased reliance on purchased processed foods.
- Social networks are highly dependent on procuring and sharing wild food resources, so the current social support system would be degraded.
- The transmission of cultural values, language learning, and family cohesion would be affected because meaningful family-based work takes place in fish camps and similar settings for traditional ways of life.
- Values and belief systems are represented by interaction with the natural world through salmon practices, clean water practices, and symbolic rituals. Thus, core beliefs would be challenged by a loss of salmon resources, potentially resulting in a breakdown of cultural values, mental health degradation, and behavioral disorders.
- The region exhibits a high degree of cultural uniformity tied to shared traditional and customary practices, so significant change could provoke increased tension and discord both between villages and among village residents.

Dietary transition away from subsistence foods in rural Alaska carries a high risk of increased consumption of processed simple carbohydrates and saturated fats, which has occurred in urban communities that have low availability and high cost of fresh produce, fruits, and whole grains (Kuhnlein et al. 2001, Bersamin et al. 2006). Available alternative food sources may not be economically obtainable and are not as healthful. Section 3 describes the replacement value of subsistence salmon. Compounding the detrimental shift to a less healthful diet, the physical benefits of engaging in a subsistence lifestyle also would be reduced (EPA 2014: Appendix D).

The magnitude of human health and cultural effects related to potential decreases in resources would depend on the magnitude of these reductions. A small reduction in salmon quality or quantity may not have significant effects on subsistence food resources, human health, or cultural and social organization. However, a significant reduction in salmon quality or quantity would significantly negatively affect these salmon-based cultures. Ultimately, the magnitude of overall impacts would depend on many factors,

including the location and temporal scale of effects, cultural resilience, the degree and consequences of cultural adaptation, and the availability of alternative subsistence resources.

However, even a negligible reduction in salmon quantity or quality related to mining activities could decrease use of salmon resources, based on the perception of subtle changes in the salmon resource. Interviews with tribal Elders and culture bearers indicate that perceptions of subtle changes to salmon quality are essential to subsistence users, even if there are no measurable changes in the quality and quantity of salmon (EPA 2014: Appendix D). In addition to actual exposure to environmental contamination, the perception of exposure to contamination is linked to known health consequences, including stress and anxiety about the safety of subsistence foods and avoidance of subsistence food sources (Joyce 2008, CEAA 2010, Loring et al. 2010, USACE 2020a: Section 4.9).

The 2020 Mine Plan would likely adversely affect access to subsistence harvest areas, as well as the availability, abundance, and quality of subsistence resources due to impacts on fishery areas (Section 4.2) and wildlife (Section 6.1.1). These impacts would endure long beyond mine closure, though with diminishing intensity following closure, unless there are any impoundment failures creating mine waste releases. The FEIS confirms reduced availability of subsistence resources due to habitat loss, disturbance, displacement, and contamination from fugitive dust deposition. The FEIS also states that the reduction of available harvest areas would result in increased costs and time for traveling to alternative harvest areas (USACE 2020a: Section 4.9). However, this assumes that subsistence users would adapt to changes in harvest areas. EPA recognizes that subsistence users may not adapt to these changes due to the ability, capacity, or cultural willingness to access alternate areas and make dietary substitutions across all sectors of the population. However, increased economic opportunity and income could enable subsistence users to afford necessary subsistence technologies (USACE 2020a: Section 4.9).

Further, the FEIS confirms that long-term sociocultural impacts to subsistence users and communities could occur due to the adverse impacts to resource abundance, availability, quality, and access due to the 2020 Mine Plan. These sociocultural impacts could result in adverse effects on community health and well-being, cultural identity and continuity, traditional knowledge transfer, language, spirituality, and social relations (USACE 2020a: Section 4.9).

6.3.2 Traditional Ecological Knowledge

In November 2021, the White House issued a memo, *Indigenous Traditional Ecological Knowledge and Federal Decision Making,* regarding the federal government's commitment to incorporate indigenous

traditional ecological knowledge[106] (ITEK) into its decision-making and scientific inquiry where appropriate.[107] As defined by the 2021 White House memo:

> ITEK is a body of observations, oral and written knowledge, practices, and beliefs that promote environmental sustainability and the responsible stewardship of natural resources through relationships between humans and environmental systems. It is applied to phenomena across biological, physical, cultural and spiritual systems. ITEK has evolved over millennia, continues to evolve, and includes insights based on evidence acquired through direct contact with the environment and long-term experiences, as well as extensive observations, lessons, and skills passed from generation to generation. ITEK is owned by Indigenous people—including, but not limited to, Tribal Nations, Native Americans, Alaska Natives, and Native Hawaiians.

In the Nushagak and Kvichak watersheds, home primarily to the Yup'ik and Dena'ina, indigenous peoples have been harvesting wild resources for at least 12,000 years and harvesting salmon for at least 4,000 years. Salmon and other subsistence resources continue to make up the large majority of the diet in the Nushagak and Kvichak River watersheds. For millennia, the Yup'ik and Dena'ina peoples and their predecessors have depended on the ecosystems that support salmon and other wild resources, and for millennia these ecosystems have remained relatively pristine (Section 3). Traditional subsistence management practices have proven to be sustainable in the Bristol Bay watershed (Boraas and Knott 2013).

The Yup'ik and Dena'ina cultures are inseparably connected to wild salmon and subsistence resources, with one Bristol Bay resident stating that salmon "defines who we are" (Boraas and Knott 2013: Page 1). Parents, grandparents, and Elders transfer knowledge about fish-harvesting practices and the environment to younger generations through demonstration and supervision (Boraas and Knott 2013, USACE 2020a: Section 4.9). The transmission of cultural values, language learning, and family cohesion often takes place in fish camps and similar settings for traditional ways of life (Boraas and Knott 2013). Social mechanisms, such as rituals, folklore, and language, all serve to encode and transmit TEK (Berkes et al. 2000). For instance, the Dena'ina words to indicate direction are based on the concept of upstream or downstream rather than cardinal direction (Boraas and Knott 2013).

Subsistence users in the Bristol Bay watershed are uniquely positioned to track important subsistence metrics, including primary and secondary subsistence species, subsistence use areas and critical habitat, subsistence practices, and observed changes in abundance and timings for subsistence species (Boraas and Knott 2013). Historically, TEK was primarily used in western science to compare and confirm the

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[106] There are many terms and definitions used to refer to the concept of traditional ecological knowledge, such as "cultural knowledge," "indigenous knowledge," and "native science." The 2021 White House memo refers to this concept as "indigenous traditional ecological knowledge" or "ITEK." The FEIS refers to this concept as "traditional knowledge." This final determination uses the term "traditional ecological knowledge" or "TEK" consistent with the BBA.

[107] On November 31, 2022, the White House released *Guidance for Federal Departments and Agencies on Indigenous Knowledge* and an accompanying memorandum titled *Implementation of Guidance for Federal Departments and Agencies on Indigenous Knowledge.* While the 2022 guidance was issued near the end of EPA's CWA Section 404(c) review, the tribal consultation process and EPA's consideration of tribal concerns are consistent with the goals of the 2022 guidance.

presence of species documented by indigenous peoples against those documented by western scientists (Knott 1998). More recently, western scientists have begun to include the larger body of TEK into their research, including to inform land and species management plans (Boraas and Knott 2013). The Alaska Department of Fish and Game, for instance, has begun to incorporate TEK into subsistence reports and databases for the Bristol Bay and Alaska Peninsula region, identifying information, such as taxonomy, subsistence use, harvest areas, habitat changes, and changes to local stocks or populations (Kenner 2003, ADF&G 2018a, ADF&G 2020).

Traditional management of wild resources, especially salmon, incorporates a deep recognition of the connection between communities and ecosystems (Boraas and Knott 2013, Berkes et al. 2000). Incorporating TEK into fisheries management can promote more equitable fishing opportunities for communities (Atlas et al. 2021). This is apparent in interviews with Alaska Native Bristol Bay residents, with one resident stating "when the fish first come up here we don't put our nets out here before a bunch of them go by for the people who live at the end of the river up in Nondalton and all those guys… We just kind of watch the salmon go by for the people who live upstream from us" (Boraas and Knott 2013: Page 100).

TEK is also incorporated in watershed- and community-level reports in the region. The Nushagak-Mulchatna Watershed Conservation Plan (NMWC 2007) conducted interviews with watershed Elders, residents, and others to develop maps of critical subsistence resources and habitats, identify traditional use areas, and document subsistence species. These data were used to inform a conservation plan for the watershed, which included identification of probable threats and strategic actions. The *K'ezghlegh: Nondalton Traditional Ecological Knowledge of Freshwater Fish* study (Stickman et al. 2003) documented TEK regarding subsistence salmon and other freshwater fish harvest through interviews with Nondalton residents. Residents provided observed changes in salmon run strength and timing, salmon appearance, environment, and the impacts of human activities on salmon and other freshwater fishes. TEK can enhance understanding of the spatial patterns of subsistence species, facilitate planning for long-term monitoring, improve management practices, track climate and environmental change, and contribute to local-capacity building for research (Berkes et al. 2000, USFWS 2011, Woll et al. 2013, Atlas et al. 2021).

TEK is inherently connected to the millennia-long subsistence way of life in Bristol Bay. The subsistence lifestyle enables Alaska Native Bristol Bay residents to continue to develop, evolve, and pass down their knowledge of the ecosystems supporting subsistence resources. As described in Section 6.3.1 and the FEIS, the 2020 Mine Plan could adversely affect participation in subsistence activities due to impacts to subsistence resource availability, abundance, and quality; changes in the perception of subsistence resource quality; personal comfort harvesting near mining facilities; and time available due to alternative, cash-paying employment. As described in the FEIS, changes such as these could have a "compounding effect on the subsistence way of life" by decreasing the transmission of TEK to younger generations (USACE 2020a: Page 4.9-12). Further, retention of TEK for traditional subsistence harvest areas and resources could be lost as subsistence users adapt to alternative areas and resources (USACE 2020a: Section 4.9).

6.3.3 Environmental Justice

In discussing environmental justice issues, it is useful to consider the following terms, as defined by EPA:

- *Environmental justice* is defined as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
- *Fair treatment* means that no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from negative environmental consequences of industrial, governmental, and commercial operations or programs and policies.
- *Meaningful involvement* means that potentially affected community members have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; the public's contribution can influence EPA's decisions; the concerns of all participants involved will be considered in the decision-making process; and the decision-makers seek out and facilitate the involvement of those potentially affected.

Executive Order 12898, titled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and its accompanying presidential memorandum establish executive branch policy on environmental justice. To the greatest extent practicable and permitted by law, Section 1-101 of the Executive Order directs each federal agency, as defined in the Executive Order, to make environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

Furthermore, Section 4-401 of the Executive Order states the following about subsistence consumption of fish and wildlife:

> In order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns.

In implementing the Executive Order, EPA considers whether there would be "disproportionately high and adverse human health or environmental effects" from its regulatory action and ensures meaningful involvement of potentially affected minority or low-income communities. The scope of the inquiry for any environmental justice analysis by EPA is directly tied to the scope of EPA's potential regulatory action. Because a CWA Section 404(c) action has the potential to affect human health and the environment of minority or low-income populations, including tribal populations, EPA evaluates environmental justice concerns when undertaking an action pursuant to its authorities under CWA Section 404(c).

Though not addressed in Executive Order 12898, the issues and concerns shared with EPA by federally recognized tribal governments during consultation meetings is considered in the environmental justice analysis because of related issues and concerns among Alaska Native communities regarding safety of subsistence foods and cultural impacts, including the sustainability of the subsistence way of life. Consultation is discussed further in Sections 2 and 6.3.

The Bristol Bay communities of the Nushagak and Kvichak River watersheds are predominantly Alaska Native, primarily Yup'ik and Dena'ina (EPA 2014: Chapter 5). Although there are other Bristol Bay communities that are concerned with potential impacts to fishery resources and, consequently, their way of life, EPA focused on communities who practice subsistence within the SFK, NFK, and UTC watersheds for this environmental justice analysis.

As described in Section 2, EPA has conducted extensive community outreach throughout its engagement in the Bristol Bay watershed. Public hearings or meetings were held in May and June 2012, August 2012, August 2014, October 2017, and June 2022, in which community members expressed concerns about the potential impacts of large-scale mining on Alaska Natives' subsistence way of life. Community members expressed concern about adverse environmental and cultural aspects of the project. They also expressed concerns about job loss, the sustainability of villages (e.g., schools closing because enrollment drops as parents make tough choices to go where jobs are available), potential tax revenue, Alaska Native Corporation economic opportunities, and the State of Alaska's concerns regarding economic opportunities for the citizens of Alaska.

Traditional and more modern spiritual practices place salmon in a position of respect and importance, as exemplified by the First Salmon Ceremony and the Great Blessing of the Waters, which symbolically purifies the water in preparation for return of the salmon. The salmon harvest provides a basis for many important cultural and social practices and values, including sharing resources, fish camp, gender and age roles, and the perception of wealth. Although a small minority of tribal Elders and culture bearers interviewed expressed a desire to increase market economy opportunities (including large-scale mining), most equated wealth with stored and shared subsistence foods. In interviews conducted for the BBA (Appendix D), the Yup'ik and Dena'ina communities of the Nushagak and Kvichak River watersheds consistently define a "wealthy person" as one with food in the freezer, a large extended family, and the freedom to pursue a subsistence way of life in the manner of their ancestors, Further, interviews of residents in the Nushagak and Kvichak River watersheds described subsistence as a year-round, full-time occupation. However, subsistence is not captured in labor statistics because it is not based on wages or a salary (EPA 2014: Appendix D).

The Alaska Native community also depends in part on the regional economy, which is primarily driven by commercial salmon fishing and tourism. The commercial fishing and recreation-based market economies provide seasonal employment for many residents, giving them both the income to purchase goods and services needed for subsistence and the time to participate year-round in subsistence activities. The fishing industry provides half of all jobs in the region, followed by government (32 percent), recreation (15 percent), and mineral exploration (3 percent) (EPA 2014: Appendix E). It is

estimated that local Bristol Bay residents held one-third of all jobs and earned almost $78 million (28 percent) of the total income traceable to the Bristol Bay watershed's salmon ecosystems in 2009 (EPA 2014: Appendix E).

The Bristol Bay Regional Vision Project convened over 50 meetings in 26 communities in 2011 to create a guidance document for communities, regional organizations, and all entities that have an interest in the Bristol Bay region. Their final report stated that the residents of the Bristol Bay watershed want "excellent schools, safe and healthy families, local jobs, access to subsistence resources, and a strong voice in determining the future direction of the region" (Bristol Bay Vision 2011: Page 1).

Several common themes emerged during this process, which were similar to themes reflected in public comments EPA received during development of the BBA:

- Family, connection to the land and water, and subsistence activities are the most important parts of people's lives, today and in the future.
- Maintaining a subsistence focus by teaching children how to engage in subsistence activities and encouraging good stewardship practices is important.
- People welcome sustainable economic development that is based largely on renewable resources. Any large development must not threaten land or waters.
- True economic development will require a regionally coordinated approach to reduce energy costs, provide business training, and ensure long-term fish stock protection.
- There should be joint planning meetings among tribes, local governments, and Corporations to create community-wide agreement on initiatives or projects.

Development of the 2020 Mine Plan would result in employment opportunities in the region, primarily for those communities nearest the mine site (Nondalton, Iliamna, and Newhalen), leading to increased revenues and year-round job opportunities throughout the lifespan of the mine, though these jobs could vary based on economic conditions and business decisions. Increased revenue in the region may lead to investments in infrastructure and services, and provide revenue needed for subsistence hunters and anglers to purchase subsistence-related technology and equipment (USACE 2020a: Section 4.9).

As discussed in Sections 3.3.6 and 6.3.1, subsistence foods make up a substantial proportion of the human diet in the Nushagak and Kvichak River watersheds, and likely contribute a disproportionately high amount of protein and certain nutrients.[108] EPA acknowledges that human health within the communities near the Pebble deposit is directly related to the subsistence way of life practiced by many residents of these communities. Additionally, EPA recognizes that subsistence use areas and related subsistence activities provide not only food but also support important cultural and social connections

[108] The BBA did not evaluate threats to human health due to physical exposure to discharged pollutants or consumption of exposed organisms, because these effects were outside the scope of the assessment (EPA 2014: Chapter 2).

within the region's communities. Social networks in the Bristol Bay region are highly dependent on procuring and sharing wild food resources, especially for cash-poor households in which members are unable to fish or hunt, such as Elders, single parents, or people with disabilities (ADF&G 2018b). If a significant adverse impact on the Nushagak and Kvichak River watersheds were to occur, the Alaska Native community reliant on these areas for food supply and cultural and social connections could experience disproportionately high and adverse effects.

SECTION 7. CONCLUSION

Discharges of dredged or fill material to construct and operate the 2020 Mine Plan's proposed mine site alone would result in the permanent loss of approximately 8.5 miles (13.7 km) of anadromous fish streams, 91 miles (147 km) of additional streams that support anadromous fish streams, and approximately 2,108 acres (8.5 km^2) of wetlands and other waters in the SFK and NFK watersheds that support anadromous fish streams. These discharges would also result in streamflow alterations that would adversely affect approximately 29 miles (46.7 km) of additional anadromous fish streams downstream of the mine site due to greater than 20 percent changes in average monthly streamflow. The aquatic resources that would be lost or damaged play an important role in supporting salmon populations in the SFK, NFK, and UTC watersheds.

EPA has determined that the large-scale loss of and damage to headwater streams, wetlands, and other aquatic resources that support salmon populations in the SFK, NFK, and UTC watersheds from the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds.

To prevent these unacceptable adverse effects, this final determination prohibits the specification of certain waters of the United States in the SFK and NFK watersheds as disposal sites for the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan, including future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material into waters of the United States that would result in the same or greater levels of aquatic resource loss or streamflow changes as the 2020 Mine Plan.

This final determination also restricts the use for specification of certain waters of the United States in the SFK, NFK, and UTC watersheds as disposal sites for the discharge of dredged or fill material associated with future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material into waters of the United States that would result in adverse effects similar or greater in nature and magnitude to the adverse effects of the 2020 Mine Plan (see Section 5 of this final determination).

Proposals to discharge dredged or fill material into waters of the United States associated with developing the Pebble deposit that are not subject to this determination remain subject to all statutory and regulatory authorities and requirements under CWA Section 404.

In light of the immense and unique economic, social, cultural, and ecological value of the aquatic resources in the region, including the fishery areas in the SFK, NFK, and UTC watersheds, and their

susceptibility to damage, EPA will carefully evaluate all future proposals to discharge dredged or fill material in the region.

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SECTION 8. REFERENCES

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Morstad, S. Fishery Biologist III, ADF&G. September 2011—Email of unpublished data to Rebecca Shaftel.

APPENDIX A

REVIEW PROCESS CONSULTATION LETTERS

APPENDIX A. REVIEW PROCESS CONSULTATION LETTERS

Appendix A provides copies of the Clean Water Act (CWA) Section 404(c) review process consultation letters sent during the CWA Section 404(c) review process for the Pebble deposit area in southwest Alaska.

As described in Section 1 of this final determination, the U.S. Environmental Protection Agency's (EPA) regulations at 40 Code of Federal Regulations (CFR) Part 231 establish a four-step CWA Section 404(c) review process. Before the Regional Administrator issues a proposed determination under Step 2 of the review process, he must notify the U.S. Army Corps of Engineers (USACE),[1] the owner(s) of record of the site, and the permit applicant (if any), that he intends to issue a public notice of a proposed determination and provide the opportunity for USACE, the owner(s) of record of the site, and the applicant (if any) to demonstrate to the satisfaction of the Regional Administrator that no unacceptable adverse effects will occur (40 CFR 231.3(a)) as a result of the discharges of dredged or fill material at issue. USACE may also notify the Regional Administrator of its intent to take corrective action to prevent unacceptable adverse effects to the Regional Administrator's satisfaction. On January 27, 2022, EPA Region 10 notified USACE, the Alaska Department of Natural Resources (ADNR), the Pebble Limited Partnership (PLP), Pebble East Claims Corporation, Pebble West Claims Corporation, and Chuchuna Minerals (the Parties) of EPA's intention to issue a proposed determination for the Pebble deposit area.

If, after the public comment period on a proposed determination, the Regional Administrator prepares and forwards a recommended determination to the Assistant Administrator for Water, the Assistant Administrator for Water shall initiate a final consultation with the Parties, who shall each have 15 days to notify the Assistant Administrator for Water of their intent to take corrective action, satisfactory to the Assistant Administrator for Water, to prevent unacceptable adverse effects (40 CFR 231.6). The Assistant Administrator for Water initiated the final consultation with the Parties[2] on December 2, 2022, providing the Parties through December 19, 2022 to notify her of their intent to take corrective action to prevent unacceptable adverse effects on anadromous fishery areas from certain discharges of dredged or fill material associated with developing the Pebble deposit.

Copies of the responses to these letters can be found at http://www.epa.gov/bristolbay.

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[1] Consistent with EPA's regulations, EPA notified USACE because the State of Alaska has not assumed, pursuant to CWA Section 404(g), responsibility to issue permits for discharges of dredged or fill material in waters of the United States under CWA Section 404 (40 CFR 231.3(a)(1)).

[2] Consistent with EPA's regulations, the USACE representative who received this notification was the Chief of Engineers.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
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OFFICE OF THE REGIONAL ADMINISTRATOR

January 27, 2022

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Dear Colonel Damon Delarosa, Ms. Corri Feige, Ms. Michelle Johnson, and Mr. John Shively:

On November 23, 2021, the Environmental Protection Agency Region 10 published notice in the Federal Register providing an update on the status of its 2014 Clean Water Act section 404(c) Proposed Determination regarding the Pebble deposit area located in Alaska's Bristol Bay watershed (Enclosed). The U.S. District Court for the District of Alaska vacated and remanded the EPA's 2019 decision to withdraw the 2014 Proposed Determination. The EPA Region 10's Federal Register notice extended applicable time requirements until May 31, 2022, to consider available information and to determine appropriate next steps in this 404(c) review process. This review includes information that has become available since the EPA issued the 2014 Proposed Determination.

The 2014 Proposed Determination proposed restrictions on the discharge of dredged or fill material into certain waters within the Bristol Bay watershed associated with mining the Pebble deposit. It was issued because of concerns that such discharges could result in unacceptable adverse effects on ecologically important streams, wetlands, lakes and ponds and the fishery areas they support including spawning and breeding areas.

I am writing to inform you that based on our evaluation to date of available information, the EPA Region 10 continues to have reason to believe that the discharge of dredged or fill material associated with mining the Pebble deposit could result in unacceptable adverse effects on important fishery areas. Accordingly, I am notifying you of my intention to issue a revised Proposed Determination. The EPA is sending letters at this time to ensure there is ample opportunity for full consideration of available information to determine next steps before May 31, 2022.

The Clean Water Act's section 404(c) regulations provide an opportunity for consultation at this stage among the EPA, the U.S. Army Corps of Engineers, the owners of record of the site and the permit applicant (if any). The EPA is sending this notice to the same entities it notified in 2014 as well as

Chuchuna Minerals. The U.S. Army Corps of Engineers' 2020 Final Environmental Impact Statement for the Pebble Mine indicates that discharges associated with mining the Pebble deposit could expand in the future into portions of areas where Chuchuna Minerals holds mining claims.

You may submit information for the record to demonstrate that no unacceptable adverse effects to fishery areas would result from discharges associated with mining the Pebble deposit, or that actions could be taken to prevent unacceptable adverse effects to waters from such mining. Consistent with the section 404(c) regulations, please provide your response by February 11, 2022. The EPA can provide additional time if requested.

I appreciate your prompt attention to this matter. If you have any questions or wish to arrange a meeting to discuss any of these issues, please contact me or have your staff contact Cami Grandinetti, at (206) 390-8890 or by email at Grandinetti.cami@epa.gov.

Sincerely,

MICHELLE PIRZADEH

Digitally signed by MICHELLE PIRZADEH
Date: 2022.01.27 08:16:15 -08'00'

Michelle L. Pirzadeh
Acting Regional Administrator

Enclosure

cc: Mr. Doug Mecum, Acting Administrator, Alaska Region
National Marine Fisheries Service

Mr. Greg Siekaniec, Regional Director
U.S. Fish and Wildlife Service

Mr. David Hobbie, Chief of Regulatory Division
U.S. Army Corps of Engineers – Alaska District

Ms. Sara Longan, Deputy Commissioner
Alaska Department of Natural Resources

Mr. Robert Retherford, Director and Vice President
Chuchuna Minerals

Mr. Reeves Amodio, LLC, Registered Agent
Pebble East Claims Corporation and Pebble West Claims Corporation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

OFFICE OF THE REGIONAL ADMINISTRATOR

February 2, 2022

Colonel Damon Delarosa
Commander
U.S. Army Corps of Engineers
Alaska District
PO Box 6898
JBER, Alaska 99506

Ms. Corri A. Feige
Commissioner
Alaska Department of Natural Resources
550 West 7th Avenue, Suite 1400
Anchorage, Alaska 99501

Ms. Michelle Johnson
Director
Chuchuna Minerals Company
11401 Olive Lane
Anchorage, Alaska 99515

Mr. John Shively
Chairman and CEO
Pebble Limited Partnership
2525 Gambell Street, Suite 405
Anchorage, Alaska 99503

Mr. John Shively
Director and President
Pebble East Claims Corporation
3201 C Street, Suite 404
Anchorage, Alaska 99503

Mr. John Shively
Director and President
Pebble West Claims Corporation
3201 C Street, Suite 505
Anchorage, Alaska 99503

Dear Colonel Damon Delarosa, Ms. Corri Feige, Ms. Michelle Johnson, and Mr. John Shively:

On January 27, 2022, the Environmental Protection Agency Region 10 transmitted a letter providing an opportunity for consultation under the Clean Water Action section 404(c) regulations among the EPA, the U.S. Army Corps of Engineers, the owners of record of the site and the permit applicant regarding the Pebble deposit area located in Southwest Alaska.

On January 29, 2022, the EPA Region 10 received a request for a 45-day extension, until March 28, 2022, from the Pebble Limited Partnership. The EPA is granting that request and is providing this extension to all recipients of this letter.

As a result, you have until March 28, 2022, to submit information for the record to demonstrate that no unacceptable adverse effects to fishery areas would result from discharges associated with mining the Pebble deposit, or that actions could be taken to prevent unacceptable adverse effects to waters from such discharges.

If you have any questions or wish to arrange a meeting to discuss any of these issues, please contact me or have your staff contact Cami Grandinetti, at (206) 390-8890 or by email at *Grandinetti.cami@epa.gov*.

Sincerely,

MICHELLE PIRZADEH
Digitally signed by MICHELLE PIRZADEH
Date: 2022.02.02 17:42:53 -08'00'

Michelle L. Pirzadeh
Acting Regional Administrator

cc: Mr. Doug Mecum, Acting Administrator, Alaska Region
National Marine Fisheries Service

Mr. Greg Siekaniec, Regional Director
U.S. Fish and Wildlife Service

Mr. David Hobbie, Chief of Regulatory Division
U.S. Army Corps of Engineers – Alaska District

Ms. Sara Longan, Deputy Commissioner
Alaska Department of Natural Resources

Mr. Robert Retherford, Director and Vice President
Chuchuna Minerals

Mr. Reeves Amodio, LLC, Registered Agent
Pebble East Claims Corporation and Pebble West Claims Corporation